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THE IRON AGE

New York, June 24, 1926

ESTABLISHED 1855

VOL. 117, No. 25

Barbed Wire—Who Invented It?



History of Early Development and Litigation— “Moonshine” Wire—More Than 200 Varieties Patented

BY ARTHUR G. WARREN*

WITH the passing of Jacob Haish†, Feb. 19, 1926, at his home in De Kalb, Ill., at an age lacking but a few days of a full century (he was born in Germany, March 9, 1826), came repeated statements in the public press crediting him with being the original inventor of barbed wire for fencing. The first appearance of barbed wire fencing was upward of a half century ago, and few people today are acquainted with the circumstances of its advent.

The present writer would make no attempt to tell the whole story (both lengthy and intricate) of the introduction of fencing armed with variously-called prickers, spurs, thorns or barbs. It is felt, however, that a distinct service will be rendered to those interested, and also to the future historian of the wire industry, by setting down a few of the facts and circumstances related to the subject, selected from historic material on file in the Industrial Museum of the American Steel & Wire Co., at Worcester, Mass.

Alphonzo Dabb

United States letters patent No. 63,482 were issued April 2, 1867, to Alphonzo Dabb, Elizabethport, N. J., for “Picketed Wrought Iron Strip” for top of a wall or fence. This appears to be the earliest suggestion patented in the United States of a fence armed with sharp, projecting points for the purpose of making it a more effective barrier.

Subsequent events make it appear that the same or a similar idea for improvement of farm fencing had

been lying dormant in many minds, only awaiting the first open suggestion as the signal for springing into action, and producing a variety of designs in defensive equipment for fences.

Lucien B. Smith

Patent No. 66,182 was granted June 25, 1867, to Lucien B. Smith, Kent, Ohio. This was the earliest United States patent for wire fencing armed with projecting points or barbs. The writer is not aware that any fencing made to this specification was ever put on the market or sold privately. Later, however, this patent became of prime importance, due to its included feature of defensive equipment.

William D. Hunt

Patent No. 67,117 was granted July 23, 1867, to William D. Hunt, Scott, N. Y., for a wire fence equipped with spur wheels. Hunt and Smith were brought into legal interference and, after examination, Hunt was awarded priority of invention, thus being officially recognized as first in the field to equip a fence wire with spurs or barbs.

This fencing was efficient, but rather difficult of construction. Hunt was without funds and, although he sold certain territorial rights, failed to interest anyone with capital in his invention, and so was unable to start manufacture. Probably not more than a half-mile in length was ever produced, and that, laboriously, by hand.

After seven years, Hunt considered himself fortunate in selling his patent rights (Oct. 15, 1874), to Charles Kennedy of Hinckley, Ill., for \$1,725 cash. The

*Secretary Industrial Museum Committee, American Steel & Wire Co., Worcester, Mass. The illustration at head of page shows a mass of barbed wire of many obsolete patterns.

†Page 600, THE IRON AGE, Feb. 25.

patent (original and reissue) was later held to be of great basic value.

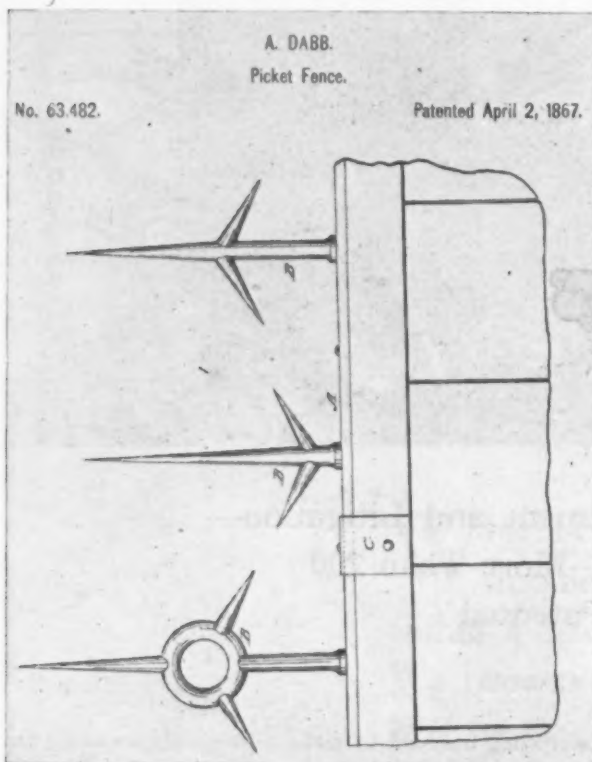
Michael Kelly

Patent No. 74,379 was granted Feb. 11, 1868, to Michael Kelly, New York, for "Thorny Fence," a wire fencing armed with perforated, elongated-diamond shaped two-point flat barbs. Patent No. 84,062 was granted Nov. 17, 1868, to the same Michael Kelly, for round wire thorns thrust through holes in flat wire.

Some eight years later these patents (original and reissue) were acquired by the Thorn Wire Hedge Co., Chicago, which for a considerable time sold the Kelly wire extensively. These also were numbered with the valuable basic patents.

Lyman P. Judson

Patent No. 118,135 was granted Aug. 15, 1871, to Lyman P. Judson, Rose, N. Y., for "Barbed Iron Strip



Earliest of All Patented Forms of Barbed or Spiked Protection Was This Peculiar Type Invented by Alphonzo Dabb in 1867. It did not get into what we now know as "production"

Fence." This called for a heavy weight of metal and the barb effect was inefficient. It was not a success.

Henry M. Rose

Patent No. 138,763 was granted May 13, 1873, to Henry M. Rose, Waterman Station, Ill., for "Wooden Strip with Metallic Points," as an improvement in wire fence. This formed a fairly effective barrier, but of crude construction when viewed alongside later successful designs. The idea was worthy of respect, however, even though its chief value lay, as will be seen, in pointing the way to something better, soon to be achieved by others.

The Big Four

In 1873, six years had elapsed since the Smith and Hunt patents were granted, and as yet nothing had been heard from any one of "the Big Four," who were to figure so prominently in later years in the barbed wire industry, viz.: Jacob Haish, Isaac L. Ellwood, Joseph F. Glidden, all residents of De Kalb, Ill., and Charles F. Washburn, representing the Washburn & Moen Mfg. Co., Worcester, Mass.

Jacob Haish

Forty-seven years of age, alert, and from boyhood watchful for opportunities of advancement, Jacob Haish

had not yet taken the first step toward securing a patent for barbed wire. In view of the seven patents for barbed fencing issued during the last preceding six years, it is at first difficult to understand this delay on the part of Haish, who later claimed priority of invention. The following is a possible explanation:

Prior to 1873 little general interest was taken in the barbed fence patents already issued. It is possible, therefore, that neither Glidden nor Haish was aware of their existence up to the time of first making application for patents in October and December, respectively, in that year.

Isaac L. Ellwood is on record as giving to the invention of Henry M. Rose, (patent No. 138,763, previously noted), the credit of suggesting not only to himself, but also to Glidden and to Haish, their first thought of attaching wire barbs to wire fencing instead of driving them into wood strips. The occasion was a county fair at De Kalb in 1873, when the trio stood together looking at an exhibit of the fencing recently patented by Rose.

It is obviously impossible to know when the thought of barbed wire for fencing first came to him, but it is a matter of United States Patent Office record that Jacob Haish's earliest application for a barbed wire patent is dated Dec. 22, 1873.

Joseph F. Glidden

Some two months earlier, on Oct. 27, 1873, Joseph F. Glidden, De Kalb, Ill., filed application for a barbed wire patent, an essential feature of the specification being a novel method of holding the spur-wires in place.

Glidden's claim was challenged by Haish and, due to interference proceedings which began July 28, 1874, and also to time required for necessary amendments to the application, the patent was delayed. Interference decision was rendered by the Patent Office on Oct. 20, in favor of Glidden, and on Nov. 24, 1874, he was granted patent No. 157,124.

Meanwhile, three barbed wire patents of later application had been granted to Haish and one to Glidden. It may be noted that in none of Glidden's several applications did he claim to have invented the spurs or barbs for use in fencing. In fact, in an application dated March 14, 1874, he expressly states, "I do not claim to have originated the devices known as spurs, or prongs on the wire, they having been used before, but confine myself," etc.

Isaac L. Ellwood

Patent No. 147,756 was granted Feb. 24, 1874, to Isaac L. Ellwood, De Kalb, Ill., for "Barbed Fence." The design was similar to one for which Haish had received a patent only a week earlier (No. 147,634, Feb. 17, 1874). It was not long before Mr. Ellwood, for good and sufficient reason, lost interest in his particular style of barbed fence and discontinued its manufacture and sale.

Charles Kennedy

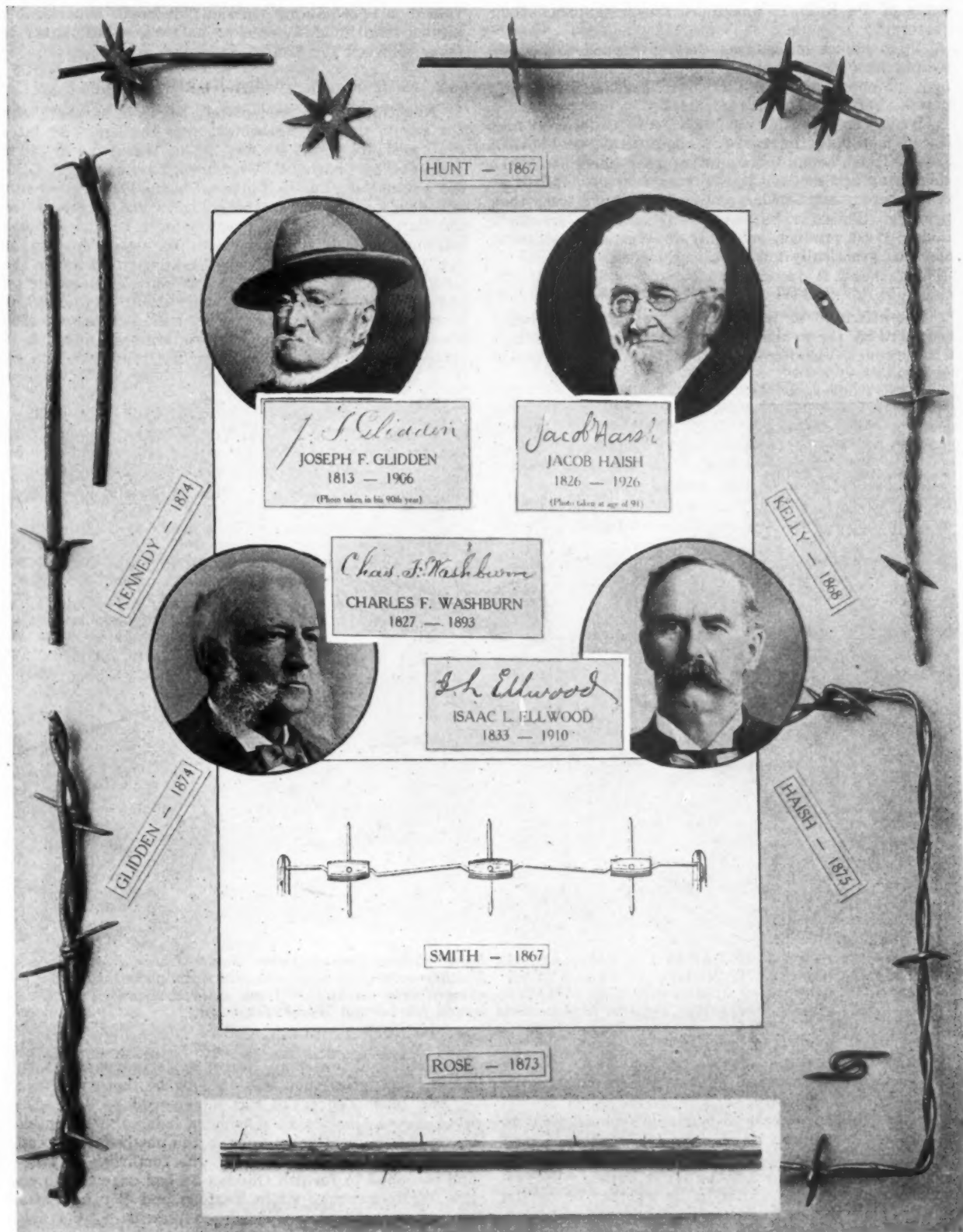
Patent No. 153,965 was granted Aug. 11, 1874, to Charles Kennedy, Hinckley, Ill., for a barb to be attached to plain wires, mainly on fencing already erected. It was in this year that Kennedy purchased the Hunt patent.

Haish and Glidden Lead

For our present purpose, it is needless to enumerate the many styles of barbed wire which soon appeared in rapid succession. We may note separately, however, the patents issued to Haish and Glidden, mentioning first the patents granted to Jacob Haish, as follows:

Patent No. 146,671—	Jan. 20, 1874
Patent No. 147,634—	Feb. 17, 1874
Patent No. 152,368—	June 23, 1874
Patent No. 164,552—	June 15, 1875
Patent No. 167,240—	Aug. 31, 1875

The last-named was for the popular "S" barb, a very excellent style which had a wide sale and on which Mr. Haish latterly rested his reputation. This patent was reissued Jan. 6, 1880, as No. 9036.



Surrounded by Seven of the Earliest Forms of Barbed Fence—Wire and Other—Are "The Big Four" in the Famous Barbed Wire Patent Litigation, Which Lasted from 1874 to 1892. Legal animosity did not cut short their useful lives, for two of the four went well past 90 and Mr. Haish reached within 18 days of rounding out a full century. The Glidden and Haish designs—at lower left and right respectively—are the only ones of the seven examples which had the qualities necessary for retaining public favor over many years.

Joseph F. Glidden's patents relating to barbed wire numbered three in all, viz.:

Patent No. 150,683—May 12, 1874
(Reissued as Nos. 6913 and 6914—Feb. 8, 1876)
Patent No. 157,124—Nov. 24, 1874 (The Winner)
Patent No. 181,433—Aug. 22, 1876

The earliest invention of Glidden (patent No. 157,124, Nov. 24, 1874, for which he had filed application Oct. 27, 1873), embodied a radical improvement in barbed wire construction, and was the most practical form yet conceived. It not only proved more popular than any other style up to that time, but during a half-

century it has always held and still occupies a leading place. For many years its nearest ranking competitor was Haish's famous "S" barbed wire, which was a worthy rival.

Mr. Glidden in July, 1874, sold to Isaac L. Ellwood, hardware dealer of De Kalb, a one-half interest in this patent (No. 157,124), for \$130, plus \$135 to cover one-half of incidental expenses to date—a total of \$265.

Glidden and Ellwood then formed a partnership under the firm name of Barb Fence Co., for the manufacture and sale of barbed wire fencing. Both being resi-

dents of De Kalb, it was there they established their factory.*

Upon advice of counsel, they proceeded to acquire by purchase an interest in the Hunt, Smith and Kennedy patents. They also tried to purchase the Kelly patent, but it was not for sale.

While the output of the Barb Fence Co. was at first small, it rapidly increased. About this time (1874), Joseph Haish began the manufacture of barbed wire in a small way and met with gratifying success. It will be remembered that Glidden and Haish patents were then pending. Thus far, barbed wire fencing was strictly a Middle-West product, sold only to Western customers, and was practically unknown in the East.

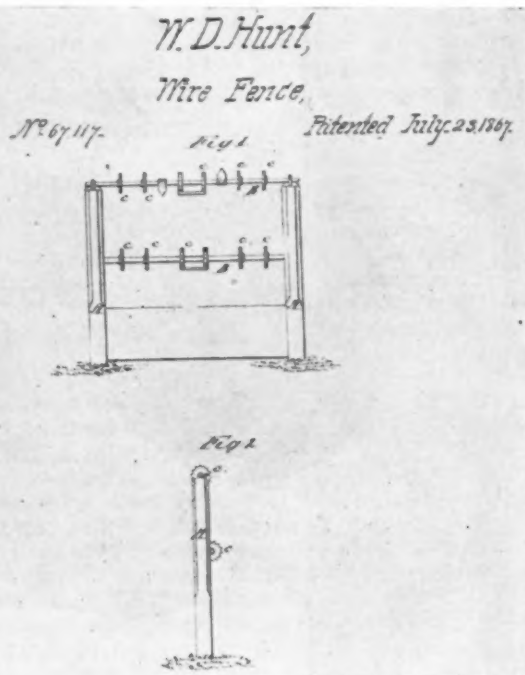
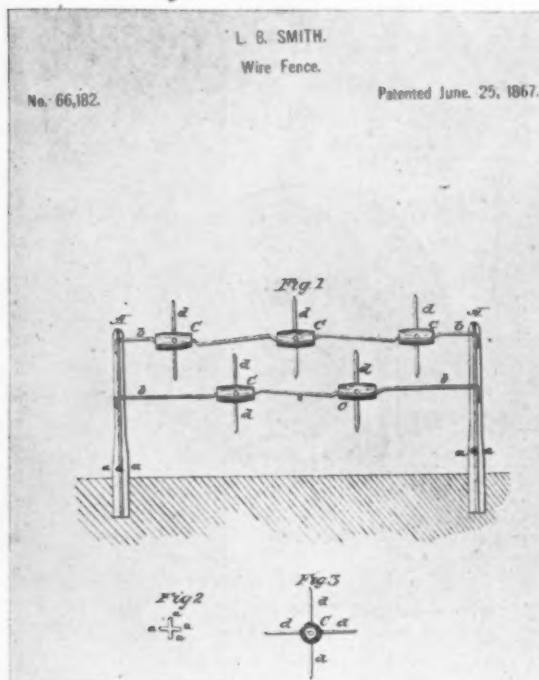
Eastern Interest Aroused

The attention of Washburn & Moen Mfg. Co. being attracted by the appearance in the market of this new wire product, Vice-President Charles F. Washburn was

valued his remaining one-half interest considerably higher than in 1874 when he sold a one-half share to Isaac Ellwood for \$265.

Glidden Retired

Negotiation was immediately begun in earnest, with the result that an agreement was reached, and later confirmed, by which in May, 1876, Washburn & Moen Mfg. Co., by Charles F. Washburn, purchased Mr. Glidden's remaining one-half interest in the Glidden patents, and also his interest in the business and properties of the Barb Fence Co., for a payment in cash and notes totaling \$60,000, and agreement to pay a royalty of $\frac{1}{4}$ c. per lb. on all barbed wire manufactured under the Glidden patent or patents by Washburn & Moen, or by any person or corporation under their authority as licensee, or otherwise; or in the manufacture of which Washburn & Moen might be interested, and which should be sold at 15c. or over per lb.; the royalty on all



Both the Smith Patent of 59 Years Ago and the Hunt Patent Issued Four Weeks Later Figured Largely in the Early History of Barbed Wire. Neither came into real use, but both patents were considered necessary of acquisition by those who entered into production from other designs. They represent the two first patents issued for barbed WIRE fence

delegated to investigate facts and conditions, with a view to acquiring an active interest in this latest addition to the wire industry.

To this end, in March, 1876, Mr. Washburn went to Chicago and met Jacob Haish, who invited him to visit his factory at De Kalb. There Mr. Washburn saw first the operation and product of the Haish barbed wire factory, and sounded the owner as to whether or not he would sell his patent rights and equipment.

Mr. Haish was willing to sell—for a consideration—and named \$200,000 as his price. Paying Mr. Haish the compliment of believing him equally serious with himself, Mr. Washburn promptly withdrew and turned to Glidden and Ellwood. Many years later Haish stated that, if Washburn had been a typical Yankee and had offered him \$25,000, he probably would have accepted it.

Introducing himself to Messrs. Glidden and Ellwood, Mr. Washburn was shown the equipment and product of the Barb Fence Co., inquired into the conditions and prospects of their business, was favorably impressed and learned that Mr. Glidden was willing to retire—for a consideration. It is not surprising that he now

*Shortly before this deal with Ellwood, Mr. Glidden offered a one-half interest in his invention to a neighbor farmer, Andrew Y. Baldwin, for \$100. Mr. Baldwin, who through hard work and thrifty living had acquired ample means to invest much more than that sum, had he wished, refused the offer, giving as his reason that he had "no faith in patents of any kind."

wire selling at less than 15c. to be correspondingly reduced. The price then was 18c. at the factory.

The Barb Fence Co. was superseded by I. L. Ellwood & Co., Charles F. Washburn being the silent but by no means inactive partner in the newly-formed concern. The factory at De Kalb was forthwith enlarged and equipped to furnish Glidden barbed wire to the entire Western trade, while Eastern and Southern customers were to be supplied from Worcester by Washburn & Moen.

By this deal, entire control of all J. F. Glidden's patents, present and future, and also of the basic patents of Hunt, Smith and Kennedy, passed into the hands of Washburn & Moen Mfg. Co. and I. L. Ellwood, who later acquired the Kelly patent (original and reissue). Thus they were enabled to establish a practical monopoly of the barbed wire business in the United States.

Barbed wire patents were granted to them in England and on the Continent of Europe as early as 1876 or 1877.

They also became possessed of the legal title to the invention of barbed wire. Although bitterly and persistently contested by Jacob Haish and others, this title was never attacked in the courts with more than temporary success. I. L. Ellwood & Co., realizing their value, made earnest and repeated efforts to purchase Haish's patents, or to obtain his cooperation, but long

without success. Eventually, however, both the patents and a limited degree of cooperation were secured.

Machine Patents Enter

Meanwhile, other inventors had been busy, and many and various were the styles of barbed wire de-

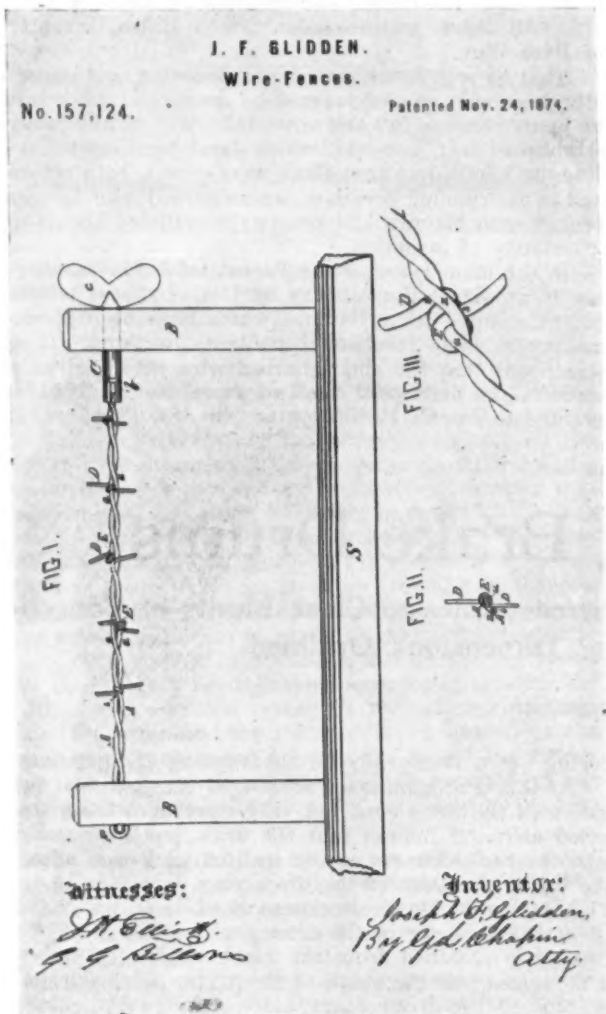
dustry, and to minimize the difficulties arising from possible infringement litigation, a general ruling was made that patents owned or controlled by applicants for license to manufacture should be transferred to the licensors as part of the terms of license.

The refusal of certain inventors and manufacturers of barbed wire either to sell patent rights, or to acknowledge the supremacy of Washburn & Moen and Ellwood, and their determined persistence in the stoutly claimed right to independent manufacture and sale, resulted in the appearance on the market throughout the Middle West and Southwest of quantities of so-called "moonshine" wire.

In the consequent litigation, the most determined and the ablest opponent of Washburn & Moen and Ellwood, until the entrance of John W. Gates in the early 80's, was Jacob Haish. He was encouraged and supported by an ardent group of interested farmers and others, scattered throughout the Middle West.

After nearly two decades of incessant struggle in the Federal courts, marked by decision and reversal in original and appellate tribunals respectively, the United States Supreme Court on Feb. 29, 1892, rendered a final decision establishing the claim of Washburn & Moen and Ellwood over all competitors.

An occasional barbed wire case was heard subsequently in the courts, mainly for the purpose of suppressing "moonshiners," but the famous old-time con-



Glidden's Design of Barbed Wire Is What We Use Today—Virtually Unchanged After Half a Century. Competition was intensive, for years, between this style and the "S" barb invented by Jacob Haish

signed and patented. Numerous patents were issued also for machines, designed to produce Glidden's barbed wire, Haish's "S" barb wire, and other more or less prominent styles. The machine patents were second only in importance to patents for barbed wire itself, success in competition depending largely upon the speed and precision with which the leading styles of barbed wire could be produced.

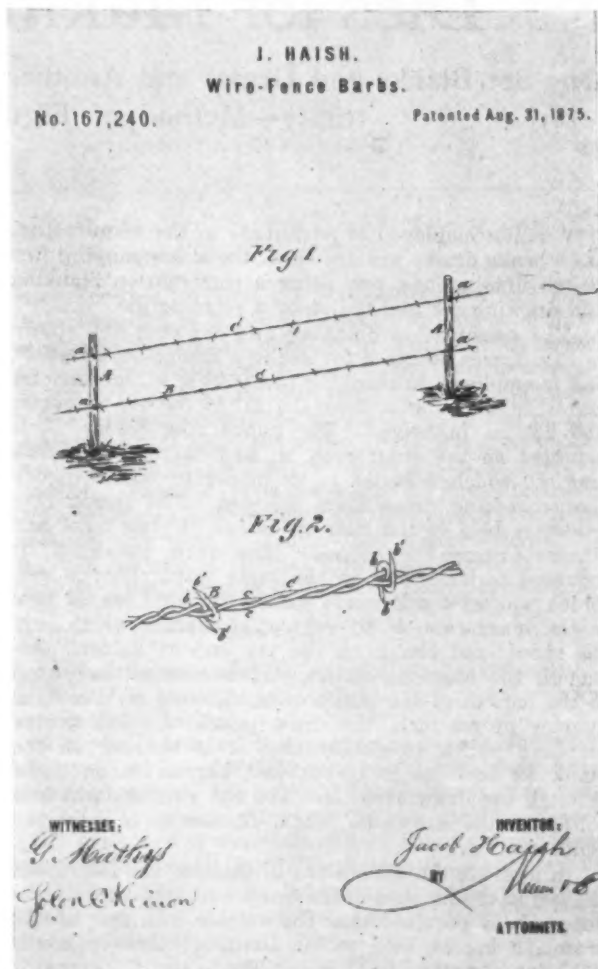
In addition to manufacturing Glidden wire in large and increasing tonnage, Washburn & Moen and Ellwood issued licenses to manufacture, to various parties, many of whom were already patentees of barbed wire, or of barbed wire machines.

I. L. Ellwood & Co. continued the policy begun by Glidden and Ellwood of acquiring, by purchase and assignment, all obtainable patents for barbed wire and barbed wire machines which promised to be of possible value. As a result, in the year 1881, they were in control of about 90 patents for barbed wire and barbed wire machinery, and in 1884, the number of such patents owned by them had increased to 220.

"Moonshine" Wire Appears

The owners of the basic patents were thus enabled to issue licenses to manufacture not only Glidden wire, but also a variety of other selected styles. They likewise acquired a similar advantage in the matter of machines for making barbed wire.

With a view to stabilizing the rapidly developing in-



One Sheet From the United States Patent Granted to Jacob Haish Fifty Years Ago, Showing the Famous "S" Barb, Which Was Popular for Many Years. This was the chief competitor of the Glidden patent

tests which held the attention of manufacturers, dealers and farmers throughout the country for so many years, were practically settled by the Supreme Court decision.

Summary

It is aimed in the foregoing to touch only some of the high-lights of barbed wire history, citing enough to render it clear that the inventions of Hunt and Smith,

patented in 1867, and of Kelly, in 1868, embodied the basic ideas in barbed wire construction.

Then came Glidden and Haish, almost neck and neck, Glidden slightly in the lead, with a design which has been steadily a favorite for upward of a half-century. For some years Haish, whose famous "S" barbed wire was practically the equal of Glidden's, remained the closest rival in the race, until by an agreement, which included concessions on both sides, he yielded his independent operation and accepted from Washburn & Moen a license to manufacture. An impartial examination of the evidence leads to the following three conclusions:

1. That both Joseph F. Glidden and Jacob Haish were inventors of barbed wire in separate and distinctive designs.
2. That each produced at least one style which proved highly successful and profitable; but
3. That neither Glidden nor Haish was the first to conceive the idea of prongs, spurs or barbs to be applied to wire fencing, this feature having been previously covered in each of the patents granted to Hunt, Smith and Kelly.

There are now to be seen in the Industrial Museum of the American Steel & Wire Co. in Worcester no fewer than 140 different styles of barbed wire. Models of more than 100 additional styles were located by the writer some months ago at the Patent Office in Wash-

ington. It is expected that eventually these will be added to the Industrial Museum collection.

Amid Jacob Haish's numerous business interests, the one relating to his fighting days held first place in his memory, mind and affections. Some years ago, so that "he who runs may read," and, reading, may accept his dictum, Mr. Haish placed above one of the entrances to his ornate and spacious residence a placard, still there, which reads: "Jacob Haish, Inventor of Barb Wire."

That he was an inventor of barbed wire, and unusually prominent as such, cannot be questioned. For this he justly receives full and unstinted credit. The equally established fact, however, which Jacob persistently refused to admit, was that there were others, both before and in the running with him, whose barbed wire designs ranked with his own and practically nullified his claim to priority of invention.

In the main lobby of the Patent Office in Washington is an interesting display of United States letters patent granted for inventions which have been epoch-making in their resulting benefits to mankind. It is significant that the single barbed wire patent given a place in this industrial "hall of fame" is No. 157,124, granted to Joseph F. Glidden on Nov. 24, 1874.

Dies for Making Brake Drums

One Set Blanks and Draws and Another Pierces Holes to Close Limits of Concentricity—Method of Figuring Dimensions Outlined

BY C. S. WHEELER

TWO dies employed to advantage in the manufacture of brake drums are shown in the accompanying line sketch illustrations, one being a combination blanking and drawing die and the other a piercing die.

The combination blanking and drawing die, shown in Fig. 1, was designed for use in a double-acting press, and is employed in blanking pieces $20\frac{1}{2}$ in. in diameter and then drawing a drum 16 in. in outside diameter and $2\frac{3}{4}$ in. in height. The punch ring holder, C, is mounted on the outer ram, A, and carries the punch ring, D, which is bolted to its holder by means of cap screws coming down from the top. The punch ring holder is held to the ram by means of stud bolts and clamps around the outside. The draw punch, E, is mounted to its holder in the same way. This holder, which was cast and made special for this job, is held in the inner ram, B, by regulation clamps which grip the shouldered shank on the top end of holder. Although the blanking punch stroke carries the punch to the bottom of the punch ring, clearing it by only a quarter of an inch, the draw punch, E, follows the blanking punch so closely that it is bearing on the blank as soon as it is cut and carries it on down through the draw ring, H. The cut ring, F, which is bolted to the draw die block, G, serves to hold the blank central.

In figuring the dimensions of this die, the tolerances allowed in the finished brake drum were basic considerations. It is required that the outside diameter of the drum, 16 in., be held within limits of plus or minus 0.010 in. Another fixed dimension is the thickness of the wall, which in this drum cannot vary more than 0.005 in., plus or minus. The outside diameter of the drum gives us the inside diameter of the draw ring, which is 16 in. We could start out at 16.010 in., but if we do that the drum will be over size on the outside as soon as the ring wears a little. So we start at the 16 in. diameter and when the ring has worn to 16.010 in. it is replaced. The worn ring then goes to the heat-treating department, to be annealed at a temperature of 1550 deg. Fahr., and then put through a shrinking operation which reduces the inside diameter about $1/16$ in. After the ring is shrunk it is again annealed and the surplus stock inside removed by

boring. It is then ready for rehardening and grinding.

As this is a drum made from $7/32$ -in. stock, and the side wall thickness must not vary more than the limits noted above, it follows that the draw punch diameter must be the thickness of the wall on each side minus the inside diameter of the draw ring, which is 16 in. This, minus double the thickness of stock, leaves 15.563 in. as the diameter of the draw punch. The stock for ironing is obtained from the blank thickening up as it is formed into the shape of the drum. This thickening up of the stock takes place during the instant preceding the passing of the drum through the ring.

The above dimensions are arrived at by taking the thickness of stock as specified by the customer and working from that. The stock, however, may vary as much as 0.010 in. above or under the nominal thickness, and this has to be taken into consideration. The method of making allowance for variations in thickness of the stock is as follows: The blank size is figured to give a predetermined amount to trim off the drum after drawing, say $\frac{1}{8}$ in. If the stock comes 10 per cent heavier than the customer's requirements and, as in this case it is $7/32$ in., then the wall of the drum will be 0.021 in. in addition to the thickness obtained by the folding up of the blank. Now, the desired height of the drum being $2\frac{3}{4}$ in., the extra thickness of the stock will add about $\frac{1}{4}$ in. to this, and this extra height will have to be trimmed off. These calculations will hold good over approximately all percentages in stock thickness variations. Then it follows that if a wide variation in stock thickness is allowed in the press room the cost of production is increased about 20 per cent for the trimming operation. If $\frac{1}{8}$ in. is figured as sufficient to trim off the drum and the stock should come 10 per cent less than the given thickness, the drum will come from the draw die nearly $\frac{1}{8}$ in. below the finished size. If the stock has a tendency to run low it cannot, in this drum, run more than 3 per cent less than the given thickness and leave anything to be trimmed.

Wall of Drums Pierced Concentric with Center Hole

One of the problems of the drum manufacturer is to be able to draw and pierce drums that come within

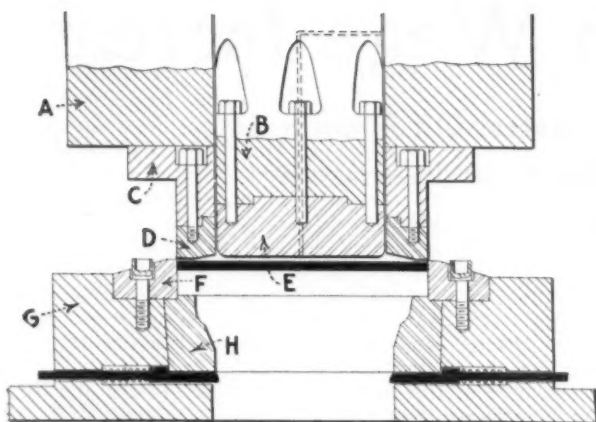


Fig. 1—Combination Blanking and Drawing Die Used in Double-Acting Press for Making Brake Drums 16 In. in Outside Diameter and 2 $\frac{3}{4}$ In. High

the customer's limits as to the concentricity of the wall of the drum with the center hole. The tendency of car builders is to reduce the tolerance allowed on the indicator reading, with the indicator bearing on the outside or inside of the drum wall with the center hole fitting a plug on which the drum is revolved. It was a fairly easy matter to draw and pierce drums when this tolerance was as much as 0.020 in., but with this cut to as low as 0.008 in. on some drums, it was necessary to design a piercing die which would pierce drums close enough to the given limits so that grinding would not be necessary. The die shown in Fig. 2 is one which will do that. With the older type piercing dies the stripper was operated by carrier rods coming up from under the press and the stripper, being carried on the punch block, was pulled down at the top of the stroke. With the new die the stripper is still mounted on the punch but is operated from a knockout bar in the ram of the press.

The punch block is in two pieces with the adapter, A, mounted in the top. A pin operated on by a bar in the ram bears down on the knockout plate, D. This in turn rests on the knockout screws, E, which are screwed into the stripper plate, H. This plate is tool steel, hardened and ground all over, with the bottom surface ground convex 0.010 in. more than the concave called for on the drum. The die plate, I, is ground concave to match the stripper plate. The 0.010 in. excess convex and concave takes care of the spring back in the drum after it is flattened. The punch holder, F, is held to the central web of the die block

by six flat-head screws and is held from shifting by two dowels.

The section, J, is a tool steel hardened and ground ring cut into four sections. Before the ring is cut apart it is finished to the same diameter as the inside of the draw ring. The die plate, I, is ground to fit the inside of the drum, with the radius on the upper corner ground to clear the radius in the drum. When the drum is placed over the die plate and the press ram comes down on it, the ring, J, holds the walls of the drum tight against the die plate while the holes are being pierced. If the drum comes from the draw die out of round this sectional ring will round it up as the ring comes down over the drum ahead of the center punch.

The reason for the ring J being in four sections is that when the draw ring wears, and the drum for this

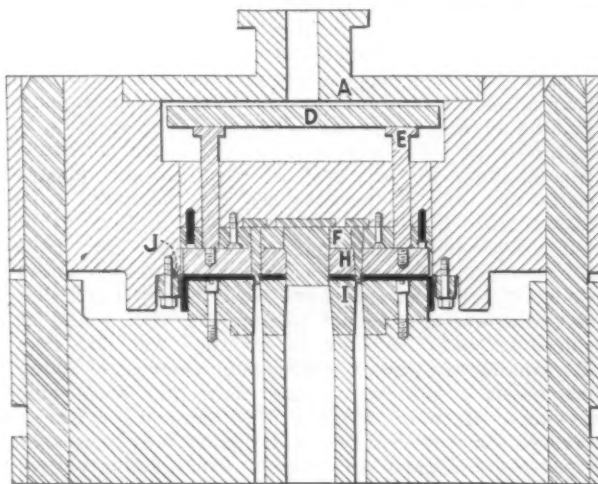


Fig. 2—Die for Piercing Center Hole of Brake Drums to Close Limits

reason becomes large on the outside diameter, the ring can be adjusted to fit. The same thing can be done if the stock should come thin, or if wear of the draw punch causes the drum to be smaller than it should. The drum, of course, stays in the ring as the ram goes up and is then knocked out by the action of the center pin on the upper knockout plate. With this type of die the drums can be held to the close limits at present required. The die plate is made of non-shrinkable steel and this as well as the other tool steel parts were hardened according to the method outlined by C. S. Smith in an article on the "Heat Treatment of Steel Dies," in THE IRON AGE of Sept. 3, 1925, page 608.

Survey of Malleable Furnace Refractories

The joint committee on foundry refractories of the American Foundrymen's Association is conducting a survey of the service conditions of the refractories used in the different branches of the foundry industry. Subcommittees composed of representative foundry managers and metallurgists have been appointed by the joint committee to look after the detailed work connected with the surveys and to report at the committee's meeting to be held in connection with the Detroit convention of the association.

The subcommittee studying malleable foundry refractories is asking that the malleable foundry managers cooperate with them by supplying such information as each manager may contribute. The committee is sending to each foundry a questionnaire which will be easy to fill out and yet supply the needed data. The committee believes that the refractories used in the malleable foundries are costing too much. The principal reasons for this excess cost are stated to be: Too many sizes and shapes of bricks now used where comparatively few sizes and shapes best suited would suffice and improper employment of methods of furnace operation and improper designs in furnace construction.

The questionnaire forms the basis for a systematic

study for improvement in composition, manufacture, specifications, testing, and application of reverberatory furnace refractories.

After the data of the questionnaire are analyzed, it is proposed to have field men investigate more fully certain phases of the work. The subcommittee conducting the malleable furnace service conditions survey is composed of James R. Allan, International Harvester Co., Chicago; H. M. Thompson, H. M. Thompson Co., Chicago, and J. H. Birdsong, National Malleable & Steel Casting Co., Cleveland. Mr. Allan is chairman of the subcommittee.

Furnace for Study of Refractories

There are numerous problems concerning the service conditions of open-hearth refractories on which it is difficult to get data from commercial furnaces. The United States Bureau of Mines plans to erect a small experimental furnace of 600 or 800 lb. capacity for the purpose of collecting data on problems similar to the following: The rate of saturation of roof brick with slag, the effect of rate of heating upon roof brick structure, the effect of insulation upon refractories, and the abrasion of port ends as affected by design and by gas velocities.

Ask a Half-Billion Wage Increase

Railroad Workers Now Far Better Off Than in Pre-War Years—Twenty Per Cent Increase in Purchasing Power Since 1914

BY LEE G. LAUCK*

IN view of the fact that the railroad labor organizations are now making additional demands for wage advances, it is pertinent to present some of the striking facts relating to the status of our railroad employees during the past twelve years, and at the same time show their position as compared with that of such workers in France and Great Britain.

Since 1913, increased wages and reduced hours have brought about a tremendous increase in the expense accounts of our railroads. The total compensation to employees of the Class 1 railroads, which constitute approximately 91 per cent of the railroad mileage and 96 per cent of the revenues, has increased from \$1,338,612,385 in 1913 to \$2,860,353,098 in 1925; while the average annual earnings per employee rose from \$761 to \$1,638. By giving effect to the pre-war dollar worth 100 cents as compared with the 63-cent dollar today, the average annual earnings in 1925 would be reduced to \$932. In 1916, the average was less than \$900, making the present earnings on the cost of living basis about 4 per cent higher than they were nine years ago. Between 1913 and 1925 operating expenses increased 109 per cent, while revenues only increased 97 per cent. Nearly 48 cents of every dollar earned by the railroads in 1925 went for labor as compared with 43 cents in 1913.

Twenty Per Cent Increase in Employee Purchasing Power

The purchasing power of all railroad employees in the United States during 1924 was 20 per cent greater than in 1914. This condition was due to the large increase in their incomes as compared with the lower advance in the cost of living. In addition these same employees have benefited far more from wage increases since 1914 than have the employees of outside industries. During 1924, wages of skilled laborers in foundries and machine shops were 108 per cent greater than in 1914, but those of railroad skilled shop labor at the end of 1923 were 142 per cent above the 1914 level, and advanced still further in 1924. Generally speaking, the railroad worker is materially better off than in 1914. His average working day is now two

hours shorter, and the purchasing power of his daily earnings is substantially greater.

In spite of this situation union leaders are demanding a restoration of the peak wage scale of 1920 for conductors and trainmen of all the railroads throughout the country; this represents an increase of \$1 to \$1.50 a day over the prevailing rate for conductors, baggagemen, flagmen, and brakemen. Conductors receiving about \$6.60 a day and \$200 per month would obtain \$7.75 a day and \$232.50 a month. Corresponding increases are asked for assistant conductors and yard service employees. In many cases the demand equals a dollar a day.

European Wages a Fraction of American

At the present time railroad conductors in the United States receive on the average three and one-fifth times as much as railroad conductors receive in Switzerland; three and one-half times as much as in Germany; four and two-fifths times as much as in Italy, and about six times as much as in Austria and Hungary. Engineers, firemen and maintenance-of-way men are paid in about the same proportion. Until about two years ago the railroad employees in Canada received approximately the same wages as were paid in this country. In 1924, nearly all American railroad employees received an increase in wages; but the railroads in Canada, under government ownership and operation, had such a deficit that they did not grant any increase.

It has been estimated that the wage demands that are now being made by the several American railroad labor organizations, if granted, would increase the total annual expenses of the country's railroads by approximately \$500,000,000, and would cut the 1926 earnings in half and bankrupt many of the smaller roads.

With these facts confronting him, the question is whether the American railroad employee believes he will be justified in supporting the leaders of the several brotherhoods in the movement they have started for a general advance in wages.

Compensation Doubled Since 1914

Some very striking facts with regard to the relationship of wages and revenues on the Class 1 railroads in the United States appear in the statistics shown in the table below:

Class 1 Railroads of the United States (Excluding switching and terminal companies)							
Year Ending June 30	Total Operating Revenues	Total Operating Expenses	Number of Employees	Aggregate Compensation	Average Annual Compensation per Employee	Ratio of Total Aggregate Compensation to	
						Total Operating Revenues	Total Operating Expenses
1913.....	\$3,108,361,215	\$2,173,463,563	1,759,020	\$1,338,612,385	\$761	43.06	61.59
1914.....	3,031,326,963	2,203,423,812	1,640,029	1,337,344,135	815	44.12	60.69
1915.....	2,871,563,047	2,021,160,614	1,491,849	1,236,305,445	829	43.05	61.17
1916.....	3,381,597,866	2,210,892,786	1,599,158	1,366,100,518	854	40.40	61.79
Year Ending Dec. 31							
1916.....	3,596,865,766	2,357,398,412	1,647,097	1,468,576,394	892	40.83	62.30
1917.....	4,014,142,747	2,829,325,124	1,732,876	1,739,482,142	1,004	43.33	61.48
1918.....	4,880,953,480	3,982,068,197	1,841,575	2,613,813,351	1,419	53.55	65.64
1919.....	5,144,795,154	4,399,715,515	1,913,422	2,842,128,432	1,486	55.24	64.60
1920.....	6,178,120,978	5,831,465,116	2,022,832	3,681,801,193	1,820	59.59	63.14
1921.....	5,516,598,242	4,562,668,302	1,660,617	2,765,236,353	1,665	50.13	60.61
1922.....	5,559,092,708	4,414,522,334	1,627,120	2,640,738,182	1,623	47.50	59.82
1923.....	6,289,580,027	4,895,166,819	1,857,713	3,004,659,673	1,617	47.77	61.38
1924.....	5,921,490,100	4,507,845,037	1,754,584	2,827,851,563	1,612	47.76	60.51
1925.....	6,120,379,400	4,535,773,038	1,746,476	2,860,353,098	1,638	47.74	63.06

*Mr. Lauck was a member for a time of the Bureau of Railway Economics at Washington and later was associated with Dr. David Friday, director of research of the National Transportation Institute.

The heavy outlay for labor is not to be construed as a condition which applies only to the railroads here in the United States. Throughout the world increased wages and reduced hours have caused a great increase in railroad expenses during recent years. This tendency is due not only to increased living costs, but also to the higher standards of living that have been one of the by-products of the war. But when considering conditions elsewhere the facts show conclusively that the American railroad employee today, for the most part, works under better conditions than do his colleagues in other countries. His pay is higher, his hours usually as short or shorter, and his standards of living are decidedly better.

Conditions in France

The latest available statistics dealing with the cost of labor on French railroads are for the year 1924, and for the most part show that the wages received by the American railroad employee greatly exceed those paid in France. The figures available for France do not tell the whole story. Official statistics for the State railroad as well as for the railroads in Alsace-Lorraine have not been released for 1924. However, the results of the five large private railroads will show very clearly the general trend in France since 1913.

The following tables give the results of operation as well as the number of employees and compensation for the years 1913 and 1924:

Operating Results			
	1913	1924	
Total operating revenues	\$322,657,400	\$358,584,643	
Total operating expenses	192,807,000	293,019,907	
Net operating revenue	129,850,400	65,564,738	
Charges	133,884,100	81,285,610	
Net operating income	Def. 4,033,700	Def. 15,720,874	

Employees and Compensation			
Year	Number of Employees	Compensation	Average Annual Compensation per Employee
1913	275,990	\$121,821,600	\$441
1924	301,000	155,161,147	515
Per cent increase			
1924 over 1913	9	27	...

The compensation to employees during the year 1924 represented 53 per cent of total operating expenditures. This large outlay for labor is due principally to the increase in the number of personnel on certain roads, brought about by a large growth in traffic, and also by steps taken to relieve the acute situation occasioned by the sharp advance in the cost of living, indemnities for residence, and increases in pensions for retirement of employees.

All classes have been benefited by the large increases effected during the past twelve years. During 1913 there were 275,990 employees, who received an annual average compensation of \$441. During the year 1924 this number was increased to approximately 301,000, whose average annual compensation was \$515, representing an increase of 17 per cent.

The proportion of railroad revenues that has been devoted to the payment of wages during the years 1913 and 1924 presents a striking picture:

Year	Total Operating Revenues	Compensation	Per Cent of Revenues Absorbed by Wages
1913	\$322,657,400	\$121,821,600	38
1924	358,584,643	155,161,147	43
Per cent increase 1924 over 1913	11	27	...

The average number of employees for all the railroad systems in France during 1925 has been estimated at about 500,000, and the total compensation at approximately \$205,195,200, or 52 per cent of total expenses. The average per employee is now about \$550.

Notwithstanding the heavy outlay for labor, the average annual compensation of a French railroad employee today amounts to approximately 60 per cent of that paid an employee on the railroads in the United States, and such is the case when allowance is made for depreciation in French money in the foreign exchange market.

In addition to wage advances the increased cost of materials and fuel has shown considerable influence on the railroad expense account. The operating deficit for all railroads during 1924 was \$25,817,424, and during the year just closed this deficit was increased to \$26,050,000.

Great Britain

Since the beginning of the war, the increased cost of labor has been severely felt by the British railroads, because of the numerous wage advances and the granting of bonuses to meet the high cost of living. The average annual compensation of British railroad employees immediately prior to the war was approximately \$312 per year, while during 1924 it rose to \$834, compared with \$932 in the United States.

The total operating revenues of the British railroads in 1913 were \$567,343,417, as compared with \$1,044,905,861 in 1924, an increase of more than 84 per cent. During the same period operating expenses increased from \$359,938,200 to \$890,207,145, or about 147 per cent. Wages advanced from \$228,725,500 in 1913 to \$583,980,000 in 1924, or nearly 155 per cent. In 1913, 40 cents of every dollar earned was paid out in wages, while in 1924 this was increased to 56 cents. Sixty-six per cent of the expense account in 1924 was accounted for by wages, while the increased cost of fuel, material and supplies accounted for an additional 20 per cent.

Conditions in regard to labor were easier during 1925 than at any time since the war, but wages still remain at an abnormally high level, 153 per cent above pre-war. The labor unions are asking for more still, which would place an additional burden of some \$219,000,000 on the railroads.

Railroads Cannot Stand Increases

Experience both here and abroad has shown that it is useless for railroad employees to talk of still better conditions of service, or of wages and hours, if the industry cannot bear the cost. They must realize that it is only where there is no restriction of output, free use of labor-saving appliances, and a high standard of individual efficiency that high wages can be paid. Labor should begin to realize that high wages, short hours, inefficiency and restriction of output cannot exist together.

The accompanying table is a summary of the relationship of wages and revenues in the three countries, and one can feel perfectly justified in concluding that the real wages of the employees of the railroads in the United States greatly exceed those paid by the lines of either France or Great Britain, and it might be safely added that railroad wages here exceed those paid in any other country of importance in the world.

Summary of Operating Revenues and Wages for Railroads of United States, France and Great Britain

	Total Operating Revenues		Aggregate Compensation to Employees		Compensation in Per Cent of Operating Revenues		Average Annual Compensation per Employee	
	1913	1924	1913	1924	1913	1924	1913	1924
United States	\$3,108,361,215	\$5,921,490,100	\$1,338,612,385	\$2,827,851,563	43	48	\$761	\$1,612
France	322,657,400	358,584,643	121,821,600	155,161,147	38	43	441	515
Great Britain	567,343,417	1,044,905,861	228,725,500	583,980,000	40	56	312	834

Rimmed Steel and How It Is Made

Products Made from It and Its Importance—Some of Its Uses and Properties—Effervescence and Skinholes

BY HENRY D. HIBBARD

"RIMMING Steel" is given as the subject of this article, though it is the same low-carbon material as that called effervescing steel in a previous paper presented to the American Institute of Mining and Metallurgical Engineers by the writer in 1919. This kind of steel was said to effervesce by another author in referring to it some years before, and the appellation was used in that paper as suitable. In the shop the shorter and equally distinctive name of "rimming steel" is now commonly applied to it, for which reason it is adopted herein.

This article is therefore a continuation of, or supplement to, that of 1919. It gives, of course, the present views of the writer. Except when otherwise noted, "steel" herein means low-carbon metal intended to, or which should be intended to, effervesce and rim in the mold. When no other process is mentioned, the excess-of-pig variation of the basic open-hearth process is meant.

Rimming steel is also called by some "open" steel, because the top of the ingot does not freeze over as rimming in proceeds, but the central metal continues fluid and in active motion for some minutes after teeming, the length of time depending on the size of the ingot. For this reason others call it "churning" steel. Killed steel, on the other hand, lies dead in the mold and the top metal quickly solidifies.

Historical

When the modern steel-making processes came into being, their promoters naturally aimed to follow established crucible steel practice, which comprehended suppression of the gases in the metal as completely as practicable. The more gas the steel evolved in the mold, the more unsound and worse the ingot. But some genius, whose name is unknown to the writer, found that in making low-carbon steel in the converter or Siemens furnace, if there was a certain abundance of gas evolved from the metal in the mold the ingot would have a sound exterior and would roll well.

The date of this discovery is also unrecorded. In 1887 the writer, though he had made it several years before, first recognized rimming steel as a particular kind, requiring particular treatment, and in that year first used cast iron caps, already introduced by others,

to lay on the rim for preventing rising of the last metal to freeze.

Uses of Rimming Steel

Rimming steel is made by the million tons for boiler plates, ship plates, welded pipes, structural steel, wire, nails, sheets and similar purposes. The advantages of good rimming steel, as compared with killed or partly killed low-carbon steels, which constitute the reasons why it is made, are:

1. Generally higher ductility, more silky fracture in the tensile test, and sound skin.
2. Cleaner steel, due to separation and elimination of non-metallic impurities from the metal as scum.
3. Better weldability.
4. Top of ingot as sound and as good as, or better than, the bottom. No pipe.
5. May be rolled direct into plates with good surfaces and properties.

Deep-seated gasholes in well-made rimming steel do not appear to be notably detrimental.

Objections to good rimming steel are:

1. Zone of skinholes across bottom of the ingot.
2. Zone of skinholes, usually, a little way up each side from the bottom.
3. Pronounced segregation.

"Off" quality rimming steel may have some of many ills, including rising in mold, thin skin, skinholes, pits, seams, blisters, cracks, redshortness, too great settling and inferior physical properties.

Welding

The superior weldability of rimming steel will probably always dictate that steel for making welded pipes and similar purposes must be rimmed. The products of the different processes vary greatly, however, in their fitness therefor.

In the order of their weldability acid Bessemer comes first, then basic Bessemer and then basic open-hearth. No practice of acid open-hearth steel made for welded pipes is known to the writer but, if made, it would probably weld better than basic open-hearth steel of the same ultimate composition. Acid Bessemer steel, because of its superior welding properties, is used almost exclusively in this country for making butt-welded pipes which are the smaller sizes, 2 in. and



THE author, who is a consulting engineer at Plainfield, N. J., has written a number of valuable articles for THE IRON AGE on practical problems of steelmaking, particularly open-hearth. Prominent among these are "Surface Cracks in Rolling Steel" and "Open-Hearth Boils," published in 1925.

This present article, in three portions, discusses an important type of steel which is the basis for a large proportion of the heavy rolled steel output of this and other countries.

under in diameter. In Europe basic Bessemer still is used for making welded pipes of all sizes, both lap-welded and butt-welded, the welding of the latter being aided by blasts of air on the to-be-welded edges of the skelp as it leaves the furnace at welding temperature (about 1420 deg. C.), and just before it enters the bell.

The reason why Bessemer steels weld better than those made in the open-hearth is not definitely known and its discussion will not therefore be entered upon here. Low-carbon steel containing aluminum is said not to weld well. The claim may be particularly true when large quantities of that metal are added to steel in the molds, say a pound or so to the ton. The oxide (Al_2O_3) formed, being infusible, may prevent the intimate metal-to-metal contact required for good welding.

Sheets

Sheet steel constitutes a very large proportion of the metal entering into the construction of pleasure automobiles and this great market has caused the development and production of sheets with better surfaces and cold-drawing ability than were formerly made, which are chiefly if not wholly made of rimming steel.

Rimming steel is also used occasionally for certain forgings, and pressed steel articles which must be made of soft material and have clean, sound surfaces.

Effervescence

The distinctive feature of rimming steel, in the making, is the escape of gases in profusion from the molten steel in the mold which causes the churning motion thereof. This motion has two essential and important effects, both mechanical, which are:

1. To dislodge the bubbles of skinhole gas which form against the frozen shell, and
2. To favor the elimination of non-metallic impurities from the metal, both of which functions are dealt with more fully later.

The steel freezes first, of course, in contact with the mold, the solidified shell appearing as a rim around the molten churning pool, which rim grows in thickness until the central metal becomes mushy, as described under "casting."

The gases of effervescence are essentially the same as those which make the bath boil (so-styled), in the furnace, the chief constituent being carbonic oxide (CO). They are set free by the metal as it cools in the mold after their saturation points at atmospheric pressure are passed. The carbonic oxide starts to escape at once in well-made steel.

Effervescence may be either too strong or too weak. If too strong, the metal in the mold settles excessively as it cools; if too weak it rises. The right degree to aim at is somewhat brisker than that required to prevent rising in the mold, so that the steel will tend to settle a little, which tendency may then be counteracted by suitable additions of aluminum as noted later. This degree is secured by correct boil in the furnace, correct amounts of gas-solvent in the metal (usually manganese) and correct casting temperature.

Too vigorous effervescence comes from too much oxide of iron in the bath, both slag and metal, or too little gas-solvent in the steel. Too weak effervescence comes from too little ore added to the bath in the furnace, or too much gas-solvent in the metal, or too high temperature thereof. When the steel is excessively hot, presumably over 2970 deg. Fahr. in the mold, there is no effervescence. The metal then has an oily appearance and continues to rise in the mold after teeming ceases. The reason for this effect of too high temperature is unknown, but it is probably due to some change in chemical affinity by the high heat.

Ingot Structure

The particular physical features of an ingot of good rimming steel are a solid outer skin or case of clean, solid metal, 2 or 3 in. thick, and certain gas holes. These gas holes occur in three distinctly different ways and are therefore manifestly made by three dif-

ferent gases or mixtures of gases. According to their locations in the ingot they are called:

1. Skinholes located in or near the skin-metal.
2. Intermediate holes located in a zone between the skinholes (if any), or the outer case and the center.
3. Central holes located at random in the central portions of the ingot.

If the gases forming these three kinds of holes have been separately analyzed, the results have not been made public so far as the writer knows. To deal more intelligently with them, definite knowledge of what they are is urgently needed, but until that is available this article may be of some service as providing a working hypothesis. These gases are all liberated in succession from the molten metal as their saturation points are passed when its temperature falls.

The ingot also varies locally in composition because of segregation, as described later. Good rimming steel does not pipe.

Skinholes

Skinholes are perhaps the worst enemy of rimming steel. When they are close to the surface they are sure to be coated within with scale in the heating operation and then appear in the rolled bloom or plate as serious defects, including seams, scabs and pits on the surface. When deeper in, they may cause internal flaws.

The gas (or gases) which form skinholes (thought to be mainly hydrogen) begins to separate from the molten steel and so to form holes at the depth at which its saturation point in the metal is passed. This point depends:

1. On the amount of the gas in the metal as tapped
2. On the diminished solvent power of the metal for the gas, due to its falling temperature.
3. To increased concentration of the gas in the metal, due to its rejection by that which has already frozen.

In the worst case the point of separation may be reached at once at the beginning of teeming, when the skin has only the thickness of a sheet of paper, or later, even to be reached only when the skin has become $\frac{1}{2}$ or $\frac{3}{4}$ in. thick, in the best.

How this gas forms in the metal is a matter for conjecture but, if it is hydrogen, it probably comes from the decomposition of water vapor from the fuel and in the air and steam with which the gas-producers or furnace is blown.

The quantity of skinhole gas remaining in the metal when it is ready for tapping may, and probably does, depend in an important degree on the boil of the bath, as it is likely that the carbonic oxide as it leaves the metal in the boiling action carries off with it some skinhole gas. If that is what happens then the bath must boil in a proper and adequate manner during the working period to eliminate any unmanageable excess of skinhole gas and so bring its concentration in the metal to an allowable minimum. Reaching its saturation point, the starting of the skinholes to form will then be duly deferred.

In good practice, therefore, the bubbles formed by the skinhole gas are comparatively deep-seated and then are dislodged almost completely by the agitation caused by the uprush of the gases of effervescence. There is a zone, however, across the bottom of the ingot, where there is little or no agitation, where the bubbles remain and usually, even with good practice, another zone of skin holes exists, extending a little way up each side from the bottom, where the churning is not strong enough to wash them all off. A few so persist in the ingot, though not enough indeed to cause the steel to rise. In the best cases the zone may extend up from the bottom 5 or 10 per cent of the height of the ingot. In others, not so good, it may extend higher, even one-half or three-quarters of the height, the part of the ingot above them being practically free from them and being therefore thick-skinned from the effective churning there. In the worst cases, when there is no effervescence, the ingot may be entirely and closely covered with skinholes with the thinnest of skins.

Skinholes around the bottoms of the sides are likely

to cause, or to appear as, splits (sometimes called laminations) in plates or sheets made from that part of the ingot. Split sheets are unsuitable for some cold-drawing operations. So for deep-drawing sheets, such as go into automobile bodies, the bottom of each ingot containing skinholes should not be used, but kept apart and otherwise applied. The surface of that part may be as good as any.

When steel rises in the mold, such action is practically always due to skinholes. When it rises immediately after teeming is finished, skinholes are being formed close to the surface with thin skins. If later, then at proportionately greater depth. Steel which rises because of a zone of skinholes around the lower half or three-quarters of the ingot is not good. Yet much structural steel, in which the great stresses of service are longitudinal and a clean surface is not demanded, is made from ingots with such gasholes and serves its purpose in a way.

To minimize the height of the zone of skinholes on the ingot sides calls, therefore, for relatively strong effervescence at the beginning of teeming. With the mold nearly or quite full, however, such action is likely to be too strong, when it may be checked by additions of aluminum as described later, so that the steel will rim in and the ingot have a flat or slightly concave top.

Armco iron, containing about 0.02 per cent of carbon, effervesces sometimes so strongly at first that no skinholes remain on the sides of the ingot, even around the bottom, though they do in a zone across the bottom, but the vigor of the action calls for large additions of aluminum later to check it and prevent settling. Sometimes from 5 to 10 oz. per ton, or even more, are required.

Rimming steel may rise slowly in the mold, say from 4 to 6 in. on an ingot 5 ft. tall, before rimming in, even when the evolution of gas is free enough to keep the surface of the steel open with no skin forming over the top. The skinholes which cause the rising may then be so far in, say $\frac{3}{8}$ in., as not to cause serious surface defects for ordinary uses. When the steel does skim over, even partially, before rimming in, it may rise 6 to 8 in., when the ingot will be plentifully infested with skinholes which may be dangerously near the surface.

At one American plant, during the war, where recarburization was all done with 30 per cent spiegel-eisen, the topcast, low-carbon steel rose in the mold usually from 6 to 8 in., sometimes overflowing the mold. Possibly silicon in the spiegeleisen interfered somewhat with the proper action in the molds. The skinholes were numerous and close to the surface. They caused a profusion of the usual surface defects in the blooms.

One heat made at that plant with ferromanganese, instead of spiegeleisen as a final addition, rose only about 4 in., and the blooming mill superintendent said that it rolled the best of any steel ever made there. The skinholes in that steel may have been $\frac{3}{8}$ in. in from the surface, not excellent but passable.

To summarize, therefore: Skinhole gas is controlled by the boil in the furnace and effervescence in the molds; the boil is controlled by oxide of iron and bath temperature; and effervescence by boil and casting temperature.

(To be continued)

GAS FUEL FOR ENAMELING

Detroit Stove Works Finds Gas Satisfactory for Baking of Sheet Steel and Iron Cast Products

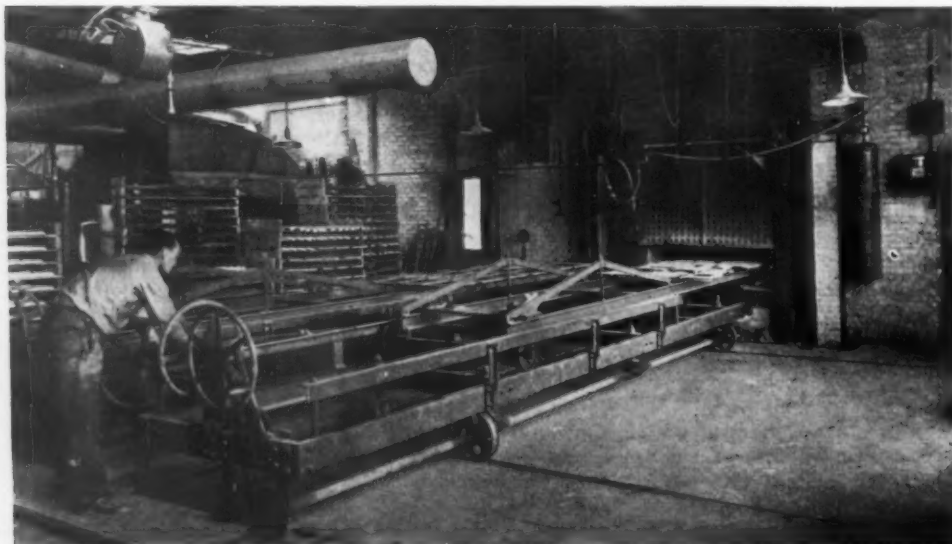
After considerable experimenting, the Detroit Stove Works, Detroit, has adopted gas for fuel in the vitreous enameling processes incident to the manufacture of stoves. Gas has been used in one furnace since last January with excellent results, and the other five furnaces in the plant will now be replaced with gas furnaces. It was found that gas maintains a constant and uniform temperature, and, furthermore, there is always sufficient heat.

Prior to last November the Detroit Stove Works was baking about 80 tons of cast iron and about 125,000 sq. ft. of sheet steel per month in coal-fired furnaces. In redesigning the furnace installation for gas, a greatly increased plant production had to be taken into account. The company is now arranging for a monthly

capacity of 160 tons of cast iron and 250,000 sq. ft. of sheet steel.

Formerly the baking was done in six muffle furnaces with 4 x 8-ft. hearths. The first gas-fired furnace installed, of which the others will be duplicates, was of the complete muffle type with a 5 x 12-ft. hearth. This furnace is different from the usual muffle type, however, in that the side walls of the muffle go up until they connect with the intrados of the furnace proper. The muffle is of Carborundum. The furnace, hence, has Carborundum for the hearth and two side walls. The furnace is of 9-in. fire brick covered with 13½ in. of Sil-o-cel insulation protected on the outside with sheet steel. The combustion system is high-pressure gas delivered through Surface Combustion Venturi inspirators. The compressing unit is a Sullivan gas compressor of a capacity of 19,000 cu. ft. per hr. at 15 lb.

The gas-fired furnace is fed by a two-carriage speed fork, which, being much more rapid than the single fork used with the coal furnaces, becomes a major item in the high capacity of the gas furnace.



Charging Machine Loading a Gas-Fired Furnace. City gas is used, with benefits of constant and uniform temperature. The furnace is of muffle type

Need for Study of Distribution

Broad Analysis of Problem Advocated by Speaker
at Convention of Industrial Engineers—Other
Phases of Waste Elimination Discussed

AN illuminating picture of the complexity of the distribution problem was drawn by Alvin E. Dodd, manager of the domestic distribution department of the Chamber of Commerce of the United States, in an address on "Studies In Distribution," at the thirteenth national convention of the Society of Industrial Engineers, held in the Bellevue-Stratford Hotel, Philadelphia, June 16, 17 and 18.

The major subject of the convention was "Practical Methods for Eliminating Waste," and the "distribution" session, at which Mr. Dodd spoke, was one of several devoted to discussion of various departments of waste elimination. These discussions and other activities of the convention are reported briefly below.

The distribution of a product is complicated by so many new factors, said Mr. Dodd, that the old conception of supplying an existing demand has been succeeded by the new question of creating a demand for a super-abundance of supply. Increase of manufacturing facilities over growth in population was pointed out, the percentages and the interpretation of them being offered only as suggestive. The population increase (16 per cent above that of 1913) is based on more or less accurate estimates, said Mr. Dodd, but the increase in manufacturing facilities (30 per cent) is a guess—not to be regarded as correct for any individual industry. The picture, although somewhat blurred, is nevertheless before us, he said, and its outlines may be recognized.

Present Status Pictured

Continuing, Mr. Dodd said, "What then do we see? We see exaggerated forms of competition. We see extraordinary displays in advertising at extraordinary costs. We see new methods of distribution manifesting an extraordinary growth. And we see that latest ghost, which, unlike Hamlet's father, walks all the time—Installment Selling—the one which is not appeased by anything less than the payment of next year's income for this year's product.

"I am not a 'calamity howler'. There is a bright side to every cloud and every new manifestation in distributive methods has both an economic reason and an economic justification. The new method of selling by direct mail advertising not improbably will result in a lessened cost of distribution. The extraordinary display of advertising has not increased materially, if at all, the cost of merchandise in such a measure as to burden the consumer. House-to-house canvassing, while we do not know its cost of distribution precisely, appears not to exceed the costs of other methods. Installment selling when rationally conducted and when surrounded by the ordinary safeguards of credit is a great improvement upon the more or less irresponsible open book accounts which have prevailed in the past.

"This forced competition has exerted and will continue to exert a pressure which results in lowered costs of production; and these lowered costs will in time have a profound effect upon the retail price of merchandise. But even more closely associated with 'distribution' is the pressure which competition exerts to induce exact studies into selling costs.

Hand-to-Mouth Buying After the War

"One of the results of post-war readjustment was hand-to-mouth buying, barely keeping pace with current demand. This imposed radical changes, transforming prevalent practices. The retailer buys less. The multiple warehouses, represented by his stock rooms and display shelves are no longer over-crowded. His re-

serve stocks the jobber may carry. But jobbers' warehouses are no longer bulging. They, too, are buying in small quantities. Their reserves the manufacturer must care for. But the manufacturer protests. He cannot regulate his production and adjust it to uncertain demand. He cannot anticipate his requirements for material. He cannot manufacture a steady flow of goods without assured outlets to relieve his stock rooms. He looks for relief. Some seek it in direct selling. Some turn to chain stores. Some try other means.

Chain Stores an Outstanding Development

"There is talk of supplanting and dispensing with various intermediary services. But all of these efforts have been groping and uncertain. The growth of chain stores and buying chains, impelled by war deflation and stimulated by certain economies the chains effect, has been one of the outstanding developments of recent years. No one knows how far they have expanded; none would dare predict how far they will extend.

"Coincidentally, jobbers have been readjusting their operations, concentrating efforts, reducing lines, seeking closer correlation between stocks and demand, simplifying services.

"American business, seeking to reduce unit costs, has displayed astonishing ingenuity in accelerating the flow of goods in fabrication and in straightening out the lines along which this flow moves," said Mr. Dodd, in another part of his address.

"It is impossible to disassociate manufacture from distribution. The goods produced must be moved to consumers. Profits earned by efficient fabrication must not be dissipated by retardation in the movement of the product from factory to consumer. Essentially, the distributive machinery is only a continuation and extension of the fabricating machinery. Deficiencies in the one offset and vitiate efficiency in the other. The whole structure is a unit. But unfortunately, while we know much of one part of the process, we know little of the other.

"The whole structure is so vast, so vague, so complex, that the inclination is to turn away from it and leave efforts to simplify and understand it to the isolated, fragmentary impulses of a few progressive minds, active in their own interests, but dealing with a segment of the problem. This tendency is defeatist; it represents surrender. But it merely postpones the day when an acute and widespread disorganization will compel attention. Why not analyze the processes, reduce them to their essential components, dissect specimens, isolate the germs of waste and failure, stimulate vital processes and promote healthy, sturdy, progressive growth?"

Need for Census of Distribution

Reference was made to the National Distribution Conference, held in 1925, and the six committee reports which were prepared. The first of these reports, which deals with the necessity for a census of distribution comparable with the census of manufactures and with the periodic collection of figures, representing quantities produced and the prices of typical kinds of merchandise from the raw material to the finished product through each of the states of distribution, was taken up by Mr. Dodd.

"What is the state of our knowledge today?" he asked. "We know practically nothing about the number of distributors of various kinds, either as wholesalers or as retailers or as dealers in particular kinds

of merchandise. We have estimates which really are little better than haphazard guesses. We know nothing certain of the value of the sales in any kind of merchandise. We know something of the spread, or margin, which is added to the manufacturers' selling price in order to make the retail selling price, but—and here is one of the most important facts relating to our lack of knowledge—all of the efforts displayed by the committee which reported on costs of distribution (and these efforts were very serious), nothing was learned as to the manufacturers' costs of distribution. Why was this so? We were driven inevitably to the conclusion that manufacturers have not studied their costs of distribution with the same desire for accuracy and uniformity which has been displayed by so many distributors.

"So far as quantities and prices are concerned, we have available already a beginning in the *Survey of Current Business* which is published monthly by the Department of Commerce. Much is gained from its collections of figures, but they do not give a complete picture. We wish to know, for example, what is the relation from month to month, and from year to year, of the reaction and effect of quantity upon price and of price upon quantity.

"When such figures are available in each of the important industries of the United States a new era of production and distribution will begin. No longer will it be necessary to guess at your future market or at the possible degree of saturation which a policy of over-production suffers."

Industrial Trucks Found Economical

IT is inefficient to use man-power when work done is measured mainly in foot-pounds, said H. J. Payne, of the electric industrial truck department of the Society for Electrical Development, Inc., in an address on "Eliminating Labor Wastes by Providing Improved Mechanical Facilities," made at the "labor" session held June 17. Most of the increased use of power has been in increasing the production of skilled workers. It was pointed out that only comparatively recently has power been widely applied to increase the production of unskilled labor, and that, as most plants have a large amount of work done by unskilled workers, there is a rich field in connection with that class of labor.

Mr. Payne's address dealt primarily with the elimination of waste in the use of unskilled workers by the application of electrically-driven industrial trucks, tractors, cranes, etc. Installations of various types of these machines were shown by lantern slides, and the reduction of handling costs in each case given. Such equipment, it was shown, when properly applied permits of quick and definite savings in material handling costs.

The first electric truck was said to have been developed 20 years ago, for handling baggage, and is still in use in Boston. The next development was the tractor, which in an application pictured was said to save five men per day per unit. The electric truck and tractor was said to cost from 30 to 70c. an hour to operate. The next development was the electric crane truck, which was followed by the lift truck, which in turn was followed by the tiering truck.

An electric truck arranged for carrying steel slabs and said to have eliminated six men, was of interest. A crane truck for handling bundles of wire was also shown. This equipment, used by a nail manufacturer, not only cut down the handling costs, but permitted the use of 300 lb. coils, instead of 150 lb., at the nail machines. A truck that was said to make more than \$100 a day in handling dies in and out of presses, was among others pictured.

Other examples of significant economies included a truck arranged for handling tumbling barrels; a truck developed for handling tin plate, and a truck for use in the heat treating department, the furnace being arranged so that the truck can run into the furnace, deposit its load and back away. A truck used in a malleable foundry for handling boxes into and out of annealing furnaces, and a truck arranged for carrying ladles of hot metal from the cupola, were of interest.

In addition to direct labor savings, other objects to be watched in eliminating waste by providing improved mechanical facilities were given as: Reduced labor turnover; increased speed of handling permits of decreasing inventory of stock in process; and inventory itself is simplified. With fewer men there is less management and decrease in management is decrease in overhead. Having materials for skilled workers always at hand is a saving. There is decrease in congestion and increase of floor space available, and speed of unloading railroad cars reduces demurrage. Efficient handling of material increases morale.

In the discussion of Mr. Payne's remarks it was brought out that up to recently electric trucks had been built in capacities of 2 or 3 tons only, but that 5-ton or even 10-ton trucks were now available. The lifting capacity of the electric truck was said to be 6 tons on a 6-ft. platform to height of 6 ft. The longest platform is 14 ft. Asked if the traditional design of freight cars prevented the best use of industrial trucks, if the doors should be changed to permit trucks getting in and out easier, Mr. Payne said that changes in the design of car doors was responsible for the development of the 10-ton trucks.

Employee Cooperation Effective in Waste Elimination

HOW employees have cooperated with management in their efforts to eliminate waste was interestingly dealt with in a paper by George Hodge, assistant manager industrial relations department, International Harvester Co., Chicago, presented at the "labor" session. The title of Mr. Hodge's paper was "Employee Cooperation in Elimination of Waste in Industry."

Getting employees to work *with* instead of merely *for* their employers was a basic attitude stressed. Accidents as a source of waste were discussed, Mr. Hodge's company having attacked this problem in an organized and systematic manner more than 18 years ago. Until 1919, when the company adopted its system of industrial relations, built upon and around the works councils, attention was concentrated on mechanical safeguarding, and on a system of rules, regulations, and discipline with continuous inspection. The results, although good, were not good enough. Beginning with 1919, through the activity of the works council, results became better and since, the cooperation of employees in safety work was said to have resulted in marked improvement.

Sickness as a cause of absenteeism and of waste was also taken up and periodical physical examinations advocated. Conserving fuel on the company's industrial railroads and reducing spoiled castings in the foundries were among other waste eliminating activities of the management and employees. An effort to reduce burden throughout the organization was successful and from this grew a scrap reduction program which produced unexpected returns. Later on the problem of tool costs, machine and maintenance costs was attacked on the same basis with gratifying results. This year a concentrated drive on quality is being made through the works councils and their committees.

Highest production efficiency was held unattainable unless the operator of a machine is a satisfied man, who not only comprehends what he is doing, but also has a clear vision of why he is doing that particular thing in that particular way. In this connection, the efforts to make the men visualize and appreciate the importance of honest work in their departments were outlined. To help them understand the why and how of tolerances, in one plant, a completed product is set up on the display floor of the factory.

Another kind of industrial waste stressed was the potential waste of unused intelligence, the waste of ideas that "die aborning." There is a wealth of ideas in the minds of all workers. Suggestion systems have been developed, said Mr. Hodge, but none of them have approximated ideal results. In the suggestion system of the Harvester company awards are made by a committee made up equally of employees and members of the management. Each suggestion is taken up and weighed for its financial value. There are 30 plants, and in each there is one man whose duty it is to work

with the man making the suggestion and also with the engineering department.

Many suggestion systems fail, it was said, because it is no one man's duty to help them along. If a suggestion is found impractical, the employee who made it is told why it was not accepted. It was said to be important that time be spent with the man whose suggestion was rejected, in order that he will not be discouraged from giving further ideas that occur to him. Instances of valuable suggestions by employees were cited, and it was evident from Mr. Hodge's remarks that the management was unusually active in encouraging this possible contribution to better methods and waste elimination.

Another address at the "labor" session was on "Eliminating Waste Through the Training of Supervisory Forces," by W. D. Stearns, superintendent of personnel, Westinghouse Electric & Mfg. Co., East Pittsburgh.

Shipyard Has Waste Reduction Program

PROBLEMS of waste elimination taken up in the last few years by the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., were interestingly outlined by W. B. Ferguson, production manager of the company, at the "manufacturing" session, held June 16. The company has established a definite program of foreman's training. Regular lectures are given and the main theme of the lectures is the elimination of waste. Definite subjects, such as the waste of wire, waste of lumber, etc., are dealt with in successive lectures. The plan of the company is to save \$10,000 in one place, \$20,000 in another, and so on. The educational scheme adopted seeks answers to the question: "How can this method be improved?" Group-meetings are held in different parts of the yard once a week. The program committee outlines weekly subjects six months in advance and assigns speakers. Outside speakers are frequently obtained. Most foremen, it was said, never miss a meeting. This educational training is considered to be of high value.

Incentive systems include piece work, subcontract and bonus. A foreman's bonus has been inaugurated this year. It includes the foremen of about 50 large divisions and is based on the showing of the divisions as compared with the budget. A small tool control system is being installed and large savings are expected to result.

In the shipbuilding industry it is impracticable to set up a system of records to tell what each man is doing each day. Shipyards are more dependent on the honesty and loyalty of minor executives than any other industry. It was pointed out that, of the 6000 men at the Newport News yard, only 2000 are dependent on the speed of equipment—two-thirds being hand work. This illustrates the difference in the problem as compared with straight manufacture.

A committee on standardization and simplification has been organized within the year. There are six different kinds of engineering departments. Good results have been accomplished, and a great deal in the simplification of design is expected. Material control was also discussed briefly.

A method for the control of waste in the cutting of lumber into fabricated parts was dealt with in a paper on "Waste Elimination in Woodworking Plants," by Carle N. Bigelow, president Bigelow, Kent, Willard & Co., Inc., Boston. The paper was preprinted and is available in booklet form.

Symptoms of Fatigue in Workers

FATIGUE was dealt with briefly in a paper on "Fatigue Waste" by Dr. E. R. Hayhurst of the College of Medicine of the Ohio State University, at a dinner meeting of the committee for the elimination of unnecessary fatigue. Because of Doctor Hayhurst's absence, the paper was read by Prof. G. H. Shepard, Purdue University, and chairman of the fatigue committee.

In answer to the question, "When do we know that the day's work is fatiguing?", it was said that there are so many conditions creating the same symptoms

of tiredness as fatigue that this question is difficult to answer in the individual case. In a group of workers it is easier. The following criteria were given: General complaints of tired feeling at close of work periods; many health complaints, requests for time off; too many quittings; "fagged" appearance of numbers of workers; defective output, not necessarily decreased output, except when measured by the week or month; lessened desire to work, disloyalty; more precisely, the evidence discovered on inspection that many of the intrinsic and extrinsic causes of fatigue are present.

Chairs Affect Proper Posture

At this meeting also some of the first principles of industrial posture and seating were outlined by Miss Nellie Swartz, director of the bureau of women in industry, of the New York State Department of Labor.

In the work of Miss Swartz's bureau it has been found that the possibility of good posture was not assured by having a good chair, but that relating of the chair and worker to the work bench and material was necessary. Two recommendations were made as to the result of investigations of the bureau. One is that posture should be varied. The ideal condition is that the worker should be able to stand at will, change in posture providing rest and saving a great deal of energy. Another principle suggested was the placing of the worker in proper relation to the work place. The worker should not have to sit on the edge of a chair to reach a foot pedal, or be required to sit improperly in a chair in order to reach up to get materials.

The most satisfactory industrial chair was said to be one having wood in its construction. The question of backs to the chair is important, and it was said that a small bar that fits into the small of the worker's back gives the necessary support and does not interfere with the arms of the worker. The connection of the seating area and the back of the chair should come in and give support to the back. The seating area does not have to be large if the worker can sit far back. Edges of the chair should not be sharp, nor long, and interfere with freedom of the worker's legs. The chair should be adjustable as to height and adjustable so that the back of the chair fits the small of the back of the workers.

The increased necessity for the elimination of waste in all departments of industry, because of the shortage of labor and impending intense struggle for world markets was stressed by L. W. Wallace, secretary of the American Engineering Council, Washington. It is only through good management and the maximum utilization of our productive energies, he said, that the labor shortage will be offset.

Actual cases of waste due to lack of coordination between the various parts of a business were presented by several speakers at the "management" session, held on the opening day of the convention. An outstanding contribution at this session was a paper on "Job Manufacturing and Executive Coordination," by W. W. Crawford, president of the Edward Valve & Mfg. Co., East Chicago, Ind. Reducing waste by establishing coordination between the sales and credit departments of a business was dealt with interestingly by T. D. Nevins, of Miller, Franklin, Basset & Co., New York.

Sessions were also held by the society's research and educational committees, and an "office" session was arranged for June 18. The annual banquet, held on the evening of June 18, was well attended. Among other entertainment activities was a motor bus trip to Valley Forge.

Officers of the society were reappointed. The next annual convention will be held in Chicago.

Plants in Philadelphia District Visited

Afternoons were devoted for the most part to plant visitations. The Ivy Rock, Pa., plant of the Alan Wood Iron & Steel Co., was included, the pouring of one of the open-hearth furnaces being seen, and also the operation of blooming and plate mills. Several members visited the plant of the Edward G. Budd Mfg. Co., Philadelphia, to witness operations from the receipt of sheets to the final assembly of all-steel automobile

bodies. A point of interest was the die storage, dies weighing from 10 to 20 tons being stacked one on top of the other, two or three high, and the smaller dies stored in steel racks. The main press shop was also of interest, not only because of the work performed but also because of the size and large number of the machines. In the jig and fixture making department, a battery of automatic die sinking machines was a center of interest. The use of welding in the manufacture of automobile doors was seen, a point of interest being the welding jigs used and also the method

of handling the doors from one operation to another. The inspection included also the assembly of the bodies, ingenious jigs also being used in this part of the work. The number employed at the Philadelphia plant is approximately 6500.

Seven other plants were visited, including that of the Leeds & Northrup Co., which was of interest to those employing a large percentage of skilled labor, and the plant of the Brill car works, at which was seen the large variety of operations entering into the building of railroad and street cars.

MACHINERY EXHIBIT LARGE

Makers of Iron and Steel Products Also Well Represented at Atlantic City Exposition

As noted on page 1737 of last week's issue, both from the standpoint of number of exhibitors and space occupied, the exhibition of the Railway Supply and Manufacturers' Association held at Atlantic City, N. J., June 9-16, reached a new high record. The following are some exhibits not mentioned in last week's issue:

There were several exhibits of grinding machinery. The Heald Machine Co., Worcester, demonstrated its new special cross-compound air pump grinding machine, and the Norton Co., Worcester, had, among other machines, a 16 and 40-in. x 120-in. piston rod grinder in operation. The Diamond Machine Co., Providence, demonstrated its heavy face grinding machine equipped with 36-in. segment wheel chuck, and also its swing frame grinder. Eleven floor type grinding machines and a large swing frame grinder were exhibited by the Black & Decker Mfg. Co., Towson, Md., in addition to a large variety of portable electric drills, tappers, screw drivers, etc. Grinding equipment was also shown by the Keystone Grinder & Mfg. Co., Pittsburgh; Charles H. Besley & Co., Chicago, and the Production Machine Co., Greenfield, Mass.

Gould & Eberhardt, Newark, N. J., demonstrated their improved 32-in. invincible shaper. The Ohio Machine Tool Co., Kenton, Ohio, exhibited its 32-in. Dreadnaught shaper.

Sawing machinery and saws were exhibited by E. C. Atkins & Co., Indianapolis, which among other machines had its new No. 4 metal cutting band saw in operation. Henry Disston & Sons, Inc., Philadelphia, had an attractive display, and the Racine Tool & Machine Co., Racine, Wis., had four machines in operation. Woodworking equipment was exhibited by the Cresson-Morris Co., Philadelphia.

Punching and shearing machinery exhibits were impressive. Two new items were shown by Henry Pels & Co., Inc., New York. One was a gate shear with the rake adjustable from 3 to 8 deg. so that an 80 x 7/8 in. machine can be made to cut 48 x 1 1/8 in. It has cross cut knives for cutting off scrap when trimming long plates. Another new item was a quadruple combined punch and shear with built-in coping tool. The Buffalo Forge Co., Buffalo, had a large exhibit which included bar cutters, combination punch, shear and bar cutters, bending rolls, forges, drills and blowers. The Schatz Mfg. Co., Poughkeepsie, N. Y., demonstrated triple combination punches and shears.

A large exhibit was that of the Watson-Stillman Co., New York, which among other equipment demonstrated a stock hydraulic adjusting machine with vertical pump, for lengthening, straightening and shortening operations; a 300-ton Riley hydraulic axle straightener with pump; a 30-ton 60-in. stroke hydro-pneumatic telescoping ram pit jack, a 100-ton hydro-pneumatic bushing press, laboratory hydraulic presses and its new hydro-screw jack.

Bolt, staybolt and pipe threading machinery, including a 1 1/2-in. double head staybolt threading machine, and a 4-in. pipe threading and cutting machine were shown by the Landis Machine Co., Waynesboro, Pa. Several die heads were demonstrated, also.

A 16-in. motor-in-base tool room lathe, thread mill-

ing attachments and oil grooving attachments were among the exhibits of the Cisco Machine Tool Co., Cincinnati. The Keller Mechanical Engineering Corporation, Brooklyn, N. Y., demonstrated a 24 x 16 x 8 in. B. L. automatic die sinker, and also cutter and radius grinders and flexible shaft grinders. The blacksmith hammer of the Blacker Engineering Co., New York, was also exhibited. In addition to electric rivet heaters and other products the American Car & Foundry Co., New York, demonstrated its vertical electric reaming machine, which is operated by one man and is intended for use in the manufacture of any product that requires the reaming of holes in steel parts before riveting or bolting. It is mounted on an overhead traveler and is automatically controlled. The Ajax Mfg. Co., Cleveland, Ohio, showed a model of its upsetting forging machine and sample forgings.

A variety of portable railroad tools was demonstrated by the H. B. Underwood Corporation, Philadelphia, E. J. Rooksby & Co., Philadelphia, and the W. C. Dunn Co., Cincinnati.

Makers of twist drills, taps, reamers, milling cutters, boring tools and other small tools were well represented, demonstrations of the tools being given on machine tools provided for the purpose.

There were many attractive exhibits of portable drills, riveters, chippers and other types of pneumatic tools, and late models of air compressors were to be seen. A pneumatic pinch bug riveter and a mud ring riveter were demonstrated by the Hanna Engineering Works, Chicago, 1 in. and 1 3/8-in. rivets being driven in mud ring and center sill sections. A working model of its pneumatic flanging machine was shown by the McCabe Mfg. Co., Lawrence, Mass., and also a 7/8-in. sheet, cold flanged.

Electric hoists, chain blocks, industrial tractors, crane trucks and lift trucks were exhibited by several companies and makers of jacks were well represented. All varieties of welding equipment were to be seen.

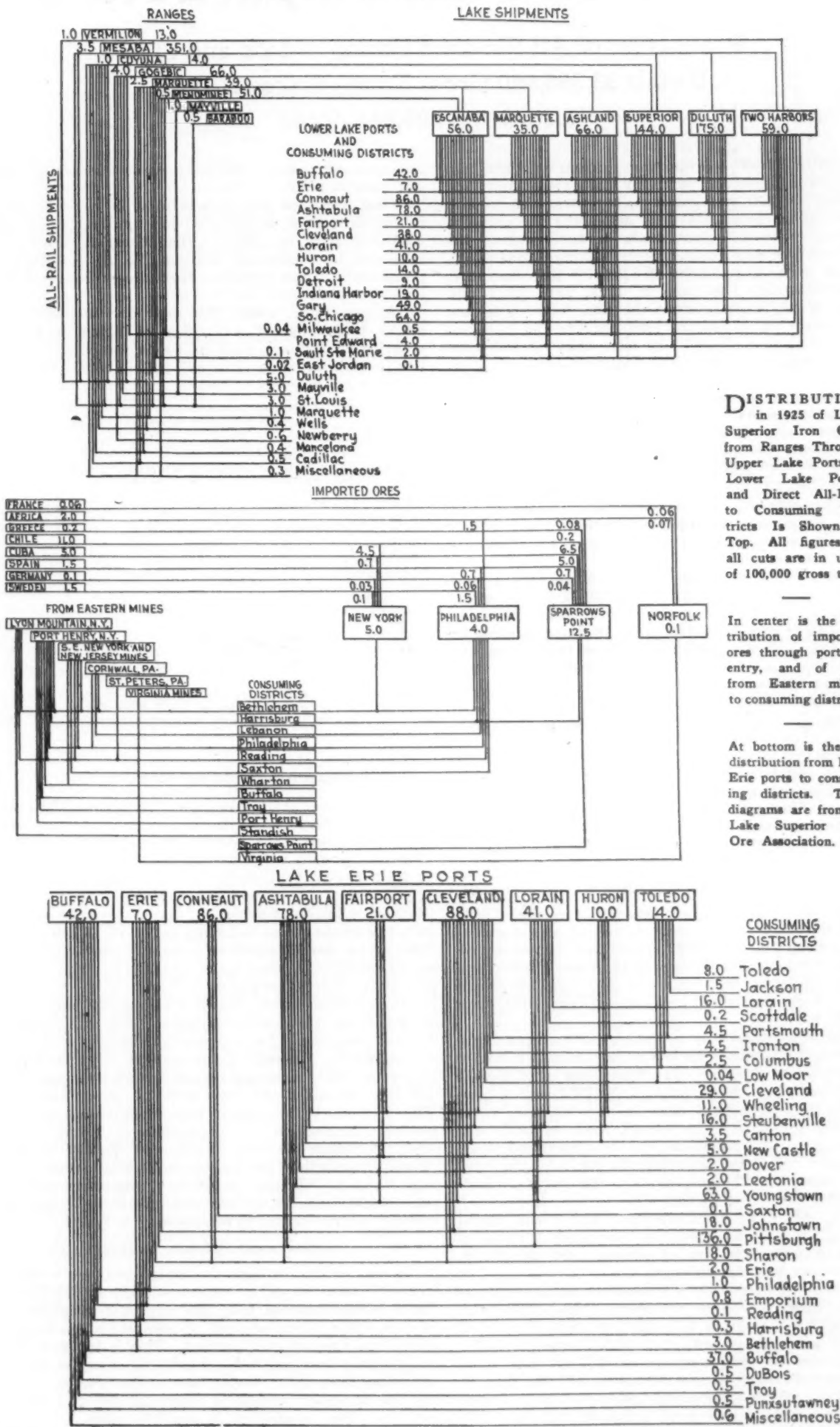
There were large and impressive displays by manufacturers of iron and steel products, steel and malleable castings makers being also well represented. Among association exhibits were the American Malleable Castings Association and the Association of Manufacturers of Chilled Car Wheels. Several makers of non-ferrous metal products also had booths.

Exhibits of gears, transmission chain, ball and roller bearings, although not numerous, were unusually attractive. There were exhibits by several paint manufacturers and also by makers of mechanical rubber products. Lubricating and oil and gasoline handling equipment, valves and fittings, packing material, water treating preparations and a wide variety of other locomotive and car supplies were also shown.

United States Imports of Needles

In 1925 the United States imported 899,569 thousands of hand sewing and darning needles, valued at \$1,039,815, and \$228,591 worth of other sorts of needles (exclusive of phonograph needles), according to the Iron and Steel Division of the Department of Commerce. The hand sewing needles came mostly from the United Kingdom (482,284 thousands, valued at \$778,036), Germany (258,453 thousands, valued at \$194,687), and Czechoslovakia (139,781 thousands, valued at \$53,685). Germany sent the greatest shipments of other needles (\$188,429 worth).

Where Lake Superior Ore Went in 1925



DISTRIBUTION
in 1925 of Lake Superior Iron Ores from Ranges Through Upper Lake Ports to Lower Lake Ports, and Direct All-Rail, to Consuming Districts Is Shown at Top. All figures in all cuts are in units of 100,000 gross tons.

In center is the distribution of imported ores through ports of entry, and of ores from Eastern mines, to consuming districts.

At bottom is the ore distribution from Lake Erie ports to consuming districts. These diagrams are from the Lake Superior Iron Ore Association.

1925 Finished Steel Output a Record

Production of All Finished Forms of Iron and Steel

Totals 33,386,960 Gross Tons—Exceeds 1923

Record by 109,884 Tons

PRODUCTION records were broken in 1925 both in steel ingots and in rolled and finished iron and steel. Ingots and castings, together, also form a new record at 45,393,524 tons, displacing the previous record of 45,060,607 tons made in 1917, during the height of the war boom. Steel castings production, however, while it amounted to 1,252,786 tons last year, was considerably less than in 1923, 1918, 1917 and 1916, and only slightly above the 1920 total. The new ingot record of 44,140,738 tons exceeds the previous high record—that of 1917—by more than 500,000 tons. These figures are those of the American Iron and Steel Institute.

Of the total output last year of finished iron and steel, iron accounted for 727,275 tons and steel for 32,659,685 tons. Except for 1924 and 1921, this iron total was the smallest in much more than 20 years. It has not reached 1,000,000 tons since 1920, but it was not less than 1,000,000 tons in any previous year of the twentieth century. The finished steel tonnage at 32,659,685 gross tons was only a fraction of 1 per cent above the estimate of 32,500,000 tons made in our Jan. 7 issue.

Pennsylvania maintains its preeminence as a steel manufacturing State, with a total of 12,469,261 gross tons, an increase of 12 per cent over 1924. Ohio, in second place with 7,759,451 tons, produced more than Indiana and Illinois combined. These two States had respectively 3,970,945 tons and 2,564,906 tons. Only two other States passed the 1,000,000-ton mark, these having been New York, with 1,315,132 tons, and Alabama, with 1,196,798 tons. West Virginia, in seventh position, made 960,719 tons.

Production of universal plates increased to 1,196,021 tons, compared with 1,000,193 tons in 1924. The output, however, was well below the 1923 total of 1,300,678 tons. Sheared plates, on the other hand, at 2,557,430 tons, went well ahead of 1923's 2,341,186 tons, and showed a gain of 57 per cent over the 1924 total of 1,652,836 tons.

Many Records Broken

Structural shapes made a new high record at 3,604,130 tons, reflecting the continuance of an enormous building program. The 1923 record was beaten by almost 200,000 tons. The average of the three latest years, at 3,431,000 tons, was nearly 4 per cent above the highest single preceding year, which was 1920, with 3,306,748 tons.

Skelp was second only to the big 1923 record. Production in 1925 was 3,229,768 tons, against 3,734,336 tons two years earlier. Merchant bars at 5,659,315 tons showed the largest total since 1920, but a considerably smaller output than in the big war years 1916, 1917 and 1918. The record, made in 1918, was 6,242,749 tons. Concrete bars, on the other hand, made a new high record by more than 20 per cent, the total having been 819,587 tons, against the previous high record of 680,867 tons in 1923.

Black sheets at 4,096,832 tons and black plates rolled on tin mills at 1,957,376 tons made a total of more than 6,000,000 tons of sheets. Of this total, 1,632,236 tons was for tinning.

Tin plate and terne plate, considered separately and together, made new high records in 1925. The total output of tin plate was 1,729,287 net tons, compared with the previous record of 1,616,557 tons in 1917. Terne plates in 1925 aggregated 127,443 net tons, compared with the previous record of 107,088 tons in 1916. The two together made 1,856,730 tons in 1925, against a previous record of 1,693,603 tons in 1917. Galvanized sheets also made a new record at 1,269,556

net tons, compared with the previous record of 1,182,431 tons in 1923.

Cast iron pipe and fittings went 26 per cent ahead of the old record, at 2,324,047 net tons, compared with 1,841,350 tons in 1924. Other detailed figures are available in Statistical Bulletin No. 3, published by the American Iron and Steel Institute, 40 Rector Street, New York.

A new table, added this year for the first time, shows production of a number of items of steadily growing importance, such as hoops, bands and cotton-ties, hot rolled strips for cold rolling, etc. The main features follow:

Production of Miscellaneous Rolled Products, Gross Tons

Products	1922	1923	1924	1925
Hoops	222,139	220,835	179,373	205,049
Bands and cotton-ties	271,101	348,480	294,269	356,165
Long angle splice bars, fish-plate bars, tie-plate bars, etc.	605,688	749,824	629,786	822,537
Rolled sheet piling..	13,220	36,716	49,679	57,264
Railroad ties.....	14,811	20,167	14,968	13,826
Rolled forging blooms, forging billets, etc.....	326,303	448,870	346,915	344,803
Spike and chain rods, bolt and nut rods, horseshoe bars, hot rolled strips, shafting, tires, etc.	*2,025,103	*2,577,249	*2,113,779	*2,814,719
Total	3,489,664	4,402,922	3,629,206	4,614,550

*Includes approximately an output in 1925 of 1,248,635 tons of hot rolled steel strips and flats for cold rolling, 827,101 tons in 1924, 865,506 tons in 1923 and 641,310 tons in 1922.

American Automobile Industry

Under the title "Facts and Figures of the Automobile Industry," the National Automobile Chamber of Commerce, New York, has issued its 1926 edition in 96 pages. As with previous editions of this work, it is densely packed with statistics and diagrams, covering all phases of the automobile industry. Production in 1925 of 4,336,754 vehicles is stated to have resulted in a wholesale value, including parts, of \$4,210,174,963. This result was obtained on a capital investment given as \$1,888,028,810, showing a production of more than \$2.20 for each \$1 invested.

Registration in the United States at the end of 1925 is given as 17,512,638 passenger cars and 2,441,749 trucks, buses, etc. The aggregate falls very little short of 20,000,000. Exports of automobiles from the United States in 1925, including assemblies abroad, numbered 536,741, or about 12 per cent of the production. This was much the largest export movement ever recorded. Production of automobiles in foreign countries, excluding Canada, aggregated 464,000 vehicles, or only one-ninth of the production in the United States and Canada. Outside production, including Canada, was 625,000 vehicles, or less than one-sixth of the production in the United States alone.

Replacement Market Growing

It was estimated that the motor vehicles scrapped in the United States in 1925 numbered 1,503,127, this figure being obtained from the aggregate registration figures, after taking account of production and imports going into the domestic market. This is the first time the discards have reached 1,000,000, the average for the preceding three years having been about 810,000. Average life of motor vehicles is estimated now to be about 8 years. Five years ago it was 6½ years, while immediately preceding the World War it was 5 years.

Rolled Iron and Steel Production in 1925

(Compiled by the American Iron and Steel Institute)

PRODUCTION OF STEEL INGOTS AND CASTINGS.

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES.

Years	Open-hearth			Bessemer.	Cru- cible.	Elec- tric.	Mis- cella- neous	Total Gross Tons.
	Basic	Acid.	Total.					
1911	14,685,932	912,718	15,598,650	7,947,854	97,653	29,105	2,844	23,676,106
1912	19,641,502	1,139,221	20,780,723	10,327,901	121,517	18,309	2,853	31,251,303
1913	20,344,626	1,255,305	21,599,931	9,545,706	121,226	30,180	3,831	31,300,874
1914	16,271,129	903,555	17,174,684	6,220,846	89,669	24,009	3,622	23,513,030
1915	22,308,725	1,370,377	23,679,102	8,287,213	113,782	69,412	1,527	32,151,036
1916	29,616,658	1,798,769	31,415,427	11,059,039	129,692	168,918	604	42,773,680
1917	32,087,507	2,061,386	34,148,893	10,479,960	126,716	304,543	495	45,060,607
1918	32,476,571	1,982,820	34,459,391	9,376,236	115,112	511,364	329	44,462,432
1919	25,719,312	1,229,382	26,948,694	7,271,562	63,572	384,452	2,952	34,671,232
1920	31,375,723	1,206,172	32,671,895	8,883,087	72,265	502,152	3,535	42,132,934
1921	15,082,564	507,238	15,589,802	4,015,938	7,613	169,499	945	19,783,797
1922	28,387,171	921,812	29,308,983	5,919,298	28,606	346,039	...	35,602,926
1923	34,665,021	1,234,636	35,899,657	8,484,088	44,079	515,872	...	44,943,696
1924	30,719,523	857,827	31,577,350	5,899,590	22,473	432,526	...	37,931,939
1925	37,087,342	947,146	38,034,488	6,723,962	19,562	615,512	...	45,393,524

PRODUCTION OF STEEL INGOTS.

1911	14,419,306	608,153	15,027,459	7,890,753	83,623	27,227	417	23,029,479
1912	19,197,504	712,371	19,909,875	10,259,151	100,967	14,147	542	30,284,682
1913	19,884,465	805,250	20,689,715	9,465,200	103,655	20,973	587	30,280,130
1914	15,936,985	633,382	16,570,367	6,154,964	78,683	15,458	312	22,819,784
1915	21,975,622	968,148	22,943,770	8,194,737	99,026	46,348	331	31,284,212
1916	29,011,146	1,227,832	30,238,978	10,916,248	120,341	126,048	302	41,401,917
1917	31,528,939	1,406,798	32,935,737	10,320,688	122,882	239,632	261	43,619,200
1918	31,970,691	1,347,870	33,318,561	9,215,392	113,782	403,068	219	43,051,022
1919	25,405,347	780,827	26,186,174	7,172,743	62,563	272,942	373	33,694,795
1920	30,926,393	759,102	31,685,495	8,778,107	70,536	348,956	299	40,881,392
1921	14,864,607	290,750	15,155,357	3,977,129	6,877	84,404	317	19,224,084
1922	27,961,190	517,045	28,478,235	5,871,565	27,561	191,057	...	34,568,418
1923	34,093,711	653,337	34,747,048	8,416,576	42,127	279,914	...	43,485,665
1924	30,263,005	454,926	30,717,931	5,846,153	21,096	225,977	...	36,811,157
1925	36,632,060	484,843	37,116,903	6,670,128	17,729	335,978	...	44,140,738

PRODUCTION OF STEEL CASTINGS.

1911	266,626	304,565	571,191	57,101	14,030	1,878	2,427	646,627
1912	443,998	426,850	870,848	68,750	20,550	4,162	2,311	966,621
1913	460,161	450,055	910,216	80,506	17,571	9,207	3,244	1,020,744
1914	334,144	270,173	604,317	65,882	11,186	8,551	3,310	693,246
1915	333,103	402,229	735,332	92,476	14,756	23,064	1,196	866,824
1916	605,512	570,937	1,176,449	142,791	9,351	42,870	302	1,371,763
1917	558,568	654,588	1,213,156	159,272	3,834	64,911	234	1,441,407
1918	505,880	634,950	1,140,830	160,844	1,330	108,296	110	1,411,410
1919	313,965	448,555	762,520	98,819	1,009	111,510	2,579	976,437
1920	449,330	537,070	986,400	104,980	1,729	155,196	3,237	1,251,542
1921	217,957	216,488	434,445	38,809	736	85,095	628	559,713
1922	425,981	404,767	830,748	47,733	1,045	154,982	...	1,034,508
1923	571,310	581,299	1,152,609	67,512	1,952	235,958	...	1,458,031
1924	456,518	402,901	859,419	53,437	1,377	206,549	...	1,120,782
1925	455,282	462,303	917,585	53,834	1,833	279,534	...	1,252,786

In 1925, 152 works in 24 States and the District of Columbia made steel ingots, against 152 works in 25 States and the District of Columbia in 1924.

In 1925, 292 works in 34 States, the District of Columbia, Alaska, and the Canal Zone, Panama, made steel castings, against 284 works in 33 States, the District of Columbia, Alaska, and the Canal Zone, Panama, in 1924.

DUPLEX STEEL INGOTS AND CASTINGS.

Included in the 37,087,342 tons of basic open-hearth steel ingots and castings produced in 1925 are 2,797,318 tons of duplex steel ingots and castings which were made from metal partly purified in Bessemer converters and finally purified in basic open-hearth steel furnaces, against 2,131,856 tons in 1924, an increase of 665,462 tons, or 31.22 per cent.

PRODUCTION OF DUPLEX STEEL INGOTS AND CASTINGS.

Years	Gross Tons.	Years	Gross Tons.	Years	Gross Tons.
1912	1,438,654	1917	3,791,830	1922	1,651,089
1913	2,210,718	1918	3,870,017	1923	2,919,286
1914	835,690	1919	2,819,785	1924	2,131,856
1915	1,781,491	1920	3,279,119	1925	2,797,318
1916	3,436,457	1921	840,251		

Similar statistics are not available prior to 1912.

ALLOY STEEL INGOTS AND CASTINGS.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS.

Years	Ingots.	Castings.	Total.	Years	Ingots.	Castings.	Total.
1912	689,392	103,109	792,501	1919	1,435,816	45,372	1,481,188
1913	625,430	88,927	714,357	1920	1,591,939	68,353	1,660,292
1914	577,107	69,846	646,953	1921	769,293	40,255	809,548
1915	923,251	97,896	1,021,147	1922	1,614,392	59,104	1,673,496
1916	1,306,157	56,458	1,362,615	1923	2,014,269	92,220	2,106,489
1917	1,576,806	67,529	1,644,335	1924	1,940,461	85,948	2,026,409
1918	1,721,367	66,485	1,787,852	1925	2,320,390	112,583	2,432,973

Similar statistics are not available prior to 1909.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS BY PROCESSES, GROSS TONS, 1925.

Processes.	Ingots.	Castings.	Total.
Open-hearth steel—basic	1,935,676	6,729	1,942,405
Open-hearth steel—acid	60,959	46,135	107,094
Bessemer steel	67,774	14,703	82,477
Crucible steel	6,607	610	7,217
Electric steel	249,374	44,406	293,780
Total	2,320,390	112,583	2,432,973

In 1925 there were 157 works in 25 States and the District of Columbia which made alloy steel ingots or castings.

ROLLED IRON AND STEEL.

In 1925 the production of all kinds of iron and steel rolled into finished forms shows an increase of 5,300,525 tons, or 18.87 per cent., as compared with 1924.

TOTAL PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, 1889-1925.

Years	Iron and steel rails.	Plates and sheets.	Nail plate.	Wire rods.	Structural shapes.	All other finished rolled.	Total Gross tons.
1889	1,522,204	716,496	259,409	363,851	...	2,374,968	5,236,928
1890	1,885,307	809,981	251,828	457,099	...	2,618,660	6,022,875
1891	1,307,176	678,927	223,312	536,607	...	2,644,941	5,390,963
1892	1,551,844	751,460	201,242	627,829	453,957	2,579,482	6,165,814
1893	1,136,458	674,345	136,113	537,272	387,307	2,104,190	4,975,685
1894	1,021,772	682,900	108,262	673,402	360,395	1,795,570	4,642,211
1895	1,306,135	991,459	95,085	791,130	517,920	2,487,845	6,189,574
1896	1,122,010	965,776	72,137	623,986	495,571	2,236,361	5,515,841
1897	1,647,892	1,207,286	94,054	970,736	583,790	2,497,970	7,001,728
1898	1,981,241	1,448,301	70,188	1,071,683	702,197	3,239,760	8,513,370
1899	2,272,700	1,903,505	85,015	1,036,398	850,376	4,146,425	10,294,419
1900	2,385,682	1,794,528	70,245	846,291	815,161	3,575,536	9,487,443
1901	2,874,639	2,254,425	68,850	1,365,934	1,013,150	4,772,329	12,349,327
1902	2,947,933	2,665,409	72,936	1,574,293	1,300,326	5,383,219	13,944,116
1903	2,992,477	2,599,665	64,102	1,503,455	1,095,813	4,952,185	13,207,697
1904	2,284,711	2,421,398	61,601	1,699,028	949,146	4,597,497	12,013,281
1905	3,375,929	3,532,230	64,542	1,808,688	1,660,519	6,398,107	16,840,015
1906	3,977,887	4,182,156	54,211	1,871,614	2,118,772	7,383,828	19,588,468
1907	3,633,654	4,248,832	52,027	2,017,583	1,940,352	7,972,374	19,864,822
1908	1,921,015	2,649,693	45,747	1,816,949	1,083,181	4,311,608	11,828,193
1909	3,023,845	4,234,346	63,746	2,335,685	2,275,562	7,711,506	19,644,690
1910	3,636,031	4,955,484	45,294	2,241,830	2,266,890	8,475,750	21,621,279
1911	2,822,790	4,488,049	48,522	2,450,453	1,912,367	7,316,990	19,039,171
1912	3,327,915	5,875,080	45,331	2,653,553	2,846,487	9,908,475	24,656,841
1913	3,502,780	5,751,037	37,503	2,464,807	3,004,972	10,030,144	24,791,243
1914	1,945,095	4,719,246	38,573	2,431,714	2,031,124	7,204,444	18,370,196
1915	2,204,203	6,077,694	31,929	3,095,907	2,437,003	10,546,188	24,392,924
1916	2,854,518	7,453,980	30,088	3,518,746	3,029,964	15,493,093	32,380,389
1917	2,944,161	8,267,616	22,864	3,137,138	3,110,000	15,585,921	33,067,700
1918	2,540,892	8,799,135	18,310	2,562,390	2,849,969	14,385,058	31,155,754
1919	2,203,843	7,372,814	12,832	2,538,476	2,614,036	10,359,543	25,101,544
1920	2,604,116	9,337,680	20,577	3,136,907	3,306,748	13,941,835	32,347,863
1921	2,178,818	4,260,574	14,573	1,564,330	1,272,624	5,483,087	14,774,006
1922	2,171,776	7,968,397	21,969	2,654,741	2,718,768	10,916,353	26,452,004
1923	2,904,516	9,497,717	22,833	3,075,892	3,405,197	14,370,921	33,277,076
1924	2,433,332	8,087,883	22,175	2,522,545	3,283,708	11,736,792	28,066,435
1925	2,785,257	9,807,659	22,038	2,844,656	3,604,130	14,323,220	33,386,960

Blooms, billets and axle blanks rolled for forging purposes are included from 1905, while semi-finished products rolled for export are included for 1912 and subsequent years. Prior to 1892 structural shapes were included in "all other finished rolled."

Refractories, Furnaces, Mill Drive

Discussion of Papers Read at the Chicago Convention of the Association of Iron and Steel Electrical Engineers

LAST week, pages 1708 to 1710, the general story was told of the meeting of the steel mill electrical engineers in Chicago in their twenty-second annual convention, running from June 7 to June 11. Important items in the discussion of four of the leading papers had to be deferred to this issue. Preceded by brief abstracts of the papers covered, they appear below. The subjects are, respectively, Refractories for Use in Steel Plants; Continuous Bloom and Billet Heating Furnaces; Gas Producer Operation; Additions to Rolling Mills at Steubenville Plant of the Wheeling Steel Corporation.

Refractories for Use in Steel Plants

BY M. C. BOOZE*

TWO major problems relating to refractories for use in iron and steel furnaces confront manufacturers and consumers today. The first is the obtaining of better service from the commercial clay and silica brick now available, and the second is the development of suitable material for more severe furnace conditions.

Improvement in service obtained from the common refractories may be brought about in several ways. The refractories themselves may be bettered, better selection may be had, or the conditions of service may be suitably altered.

Specific troubles involved in the use of refractories are taken up in detail by the author, together with tests made to determine the suitability of refractories for definite services. On metallurgical requirements he says, in part:

Metallurgical Requirements

Requirements of the greatest concern to manufacturers of steel are found in open-hearth furnaces, blast furnaces, heating furnaces, regenerators and coke ovens. These requirements must be considered with the limitations of silica, clay, chrome and magnesite refractories in view, as they are the only materials known to be usable and at the same time economically feasible.

High temperatures of open-hearth furnaces and their size make silica brick necessary. From the standpoint of spalling, clay brick would be better, but the latter would neither remain rigid in the arch nor resist the action of basic slag so well as silica brick. Magnesite brick, better suited in the furnace lining for resisting chemical attack, would not serve because of their weakness when hot. Chrome brick are unsuitable for the same reason, as well as for their pronounced spalling properties and high cost.

Of the silica brick, there is really only one grade available suitable for this service. Some slight differences exist between brands supplied for open-hearth use. As the brick must be well burned and show little residual expansion, there is little hope of bettering the spalling properties. As already explained, the resistance to attack by the basic oxides carried in the furnace gases cannot be altered. Open-hearth furnace operators cannot do more, therefore, than insure themselves of obtaining silica brick of the usual composition and burn.

Magnesite and chrome brick are required in these furnaces entirely on account of their resistance to the fluxing action of basic oxides. The magnesite, to be the most resistant to reaction, should be largely in the form of periclase. To produce this mineral form economically it is necessary that a flux or catalizer be present

during the original calcining process. For this reason iron-bearing magnesite is used or iron oxide is added to pure magnesite, previous to dead burning for refractories.

Chromite from which chrome bricks are made is obtainable in several degrees of purity and with considerable differences in physical structure. The chemical inertness of chromite to both basic and acid slags is marked and the material would be of great value if the hot strength were high and the spalling tendencies not so pronounced.

Clay Refractories

Fire clay brick properties may be readily altered in a number of ways and there is a wide choice of clay refractories for use in blast furnaces, stoves, regenerators, and heating furnaces. In blast furnaces it is fortunate that, where high refractoriness is essential the hardness is not highly important, and vice versa, because it would be difficult to develop both properties to the maximum degree in a single product. Sufficient refractoriness cannot be obtained in clay brick to resist the highest hearth temperatures and the use of cooling plates in this portion of the lining will no doubt always be necessary.

Fire clay brick for stoves, not called upon to meet severe conditions, have been known to last for several years. Here, as in regenerators, the highest thermal efficiency may be obtained by the use of the densest brick. This is contrary to the opinion held by some practical men, but may be checked by experiment.

The problem in open-hearth regenerators is to obtain brick which will not slag away rapidly and which may be salvaged when the regenerator is cleaned. Breakage is largely occasioned by rough usage at time of cleaning and this indicates the need for dense, mechanically strong brick. High density will be beneficial also in resisting erosion and in increasing the thermal efficiency of the checkers. It is necessary to use brick of good refractoriness on account of the abnormally high temperatures occasionally found in regenerators.

Where heating-furnace temperatures are extremely high, refractoriness is all-important and a relatively short life can be expected. Where the temperatures are high, but not excessive, good grades of highly silicious clay brick have been found satisfactory. Refractoriness, constancy in volume and rigidity while hot are the important factors.

In coke ovens hard-burned silica brick are required, not only to limit the permanent expansion, but also to resist the abrasive action of the coke. For high thermal efficiency and short coking periods it is necessary to operate the ovens at high temperatures and to make use of thin walls. Under these conditions the high rigidity of silica refractories is an extremely important factor. The resistance to abrasion of a specific

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brand of silica brick is developed to the highest extent by low porosity, hard burn and high mechanical strength. But the better of two products made from different deposits of ganister cannot be determined definitely by measuring these properties.

Discussion

H. C. Siebert, combustion engineer, Bethlehem Steel Co., Bethlehem, Pa., who was chairman of the meeting, stated that he was opposed to the use of water cooling on open-hearth furnaces, although he was well aware of the fact that the replacement of refractories repre-

sents fully 10 to 15 per cent of the cost of making steel in that type of furnace.

W. B. Trainer, Johns Manville, Inc., expressed the opinion that the question of refractories is more of a practical problem than a scientific problem. He also felt that in many cases materials are acclaimed as being of inferior grade when, in fact, their failure is due to carelessness on the part of workmen in operating the furnaces under their charge. He was of the opinion that the steel-jacketed open-hearth furnace, properly insulated and with less brick used in its construction, is rapidly gaining favor with steel mill engineers.

Continuous Bloom and Billet Heating Furnaces

BY EDWIN W. TREXLER*

PROPER furnace proportions as to size of combustion chamber, height and type of roof, proper size of gas passages, type and location of burners, length of flame, type of fuel, and last, but not least, a practical means for the removal of cinder, all play an important part in maintenance costs of heating furnaces.

On old furnaces, many of which have too small a combustion chamber, the refractory life is surprisingly short, especially with direct coal firing. Some of them need replacement every six to eight weeks, while on the later furnaces, where the design has been better, the roof will last a year or more without extensive repairs. The same is true of old gas-fired furnaces, the roof lasting from four to six months, while with the modern furnace there is no disintegration of the roof noticeable after six months' operation.

Water Cooling Not an Unmixed Blessing

Because of short life of refractories, water cooling has been employed to reduce replacements. Water cooling of roofs has been eliminated in later furnaces and the flat suspended roof is giving satisfactory service on continuous bloom and billet heating furnaces.

The hearth of the furnace is the point of highest temperature and, therefore, highest maintenance, due to cinder erosion and abrasion in removing cinders. Here again, in most cases, water cooling is employed. We believe the better method is air cooling by draw-

ing the air for combustion through passages underneath the hearth, thus heating the air and cooling the hearth enough so that the cinder does not adhere and is easily removed.

Water-cooled skid pipes are a detriment to efficiency. They affect the quality of steel because of the black spots left on the heated billet and also require a longer hearth. Their replacement and repair are often a difficult and trying job. One large continuous furnace which has been operating for several months without skid pipes is still satisfactory.

Elimination of water cooling in heating furnaces is important from the efficiency standpoint, as the heat absorbed by the cooling water is from 2 to 5 per cent of the total heat supplied by the fuel.

Discussion

Albin G. Witting, assistant chief engineer, Gary works, Illinois Steel Co., said that it is difficult to find any refractory which will hold up for any long period when coke oven gas is used as a fuel. In his opinion the arched roof on the open-hearth furnace is a necessity to concentrate the radiation.

W. P. Chandler, Jr., special engineer, Carnegie Steel Co., Pittsburgh, stated that at present the refractory problem limits furnace operation and that at the moment the only recourse the engineer has is to change his design or resort to water cooling. In his opinion the flat roof on open-hearth furnaces may lead to a uniform heat being thrown down on the bath.

*Combustion engineer, Bethlehem Steel Co., Johnstown, Pa.

Gas Producer Operation

BY F. E. LEAHY*

IN this paper were outlined some results obtained from recording instruments installed to guide the operators and check the practice, and to secure results in daily practice close to those obtained on tests made under skilled observers.

It is possible to obtain in modern producers a rate of gasification of 2000 lb. of coal per hr. or higher. Assuming the coal contains 13,500 B.t.u. per lb., a boiler consuming the same amount of coal per hour at 70 per cent efficiency would develop 565 boiler hp. At the present price of fuel we cannot afford not to check carefully the operations of a fuel-consuming unit of such size.

Conclusion

From the data presented, it is essential for uniform operation to equip the gas producer house with sufficient instruments to guide the operators and check variations in practice. The number and kind used should be sufficient to enable the operators to keep their practice uniform and as close to the ideal as possible with the fuel and equipment available.

Automatic control should be extended to include agitation and coal feed, to proportion the poking and coal feed to the load on the producers. The instru-

ments recommended will not only be a help in operation, but can be used to analyze furnace operations, to determine the magnitude of peak loads, their occurrence, comparison of day and night turns and fuel required per ton of output, as well as the best gas for the operations.

Discussion

Albin G. Witting questioned the statement of the author to the effect that the amount of coal gas supplied is in proportion to the amount of steam used. Mr. Witting's contention was that the amount of steam used will depend upon the condition of the fuel bed. He pointed out that we may look forward to a producer which will not use steam under pressure, but the air will pass over and through the water jacket, absorbing moisture, and then will be blown directly into the producer. He is strongly in favor of the use of automatic gas producer control and instruments.

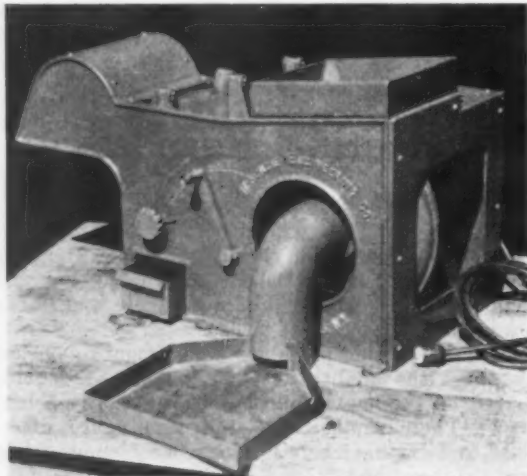
Martin J. Conway, combustion engineer, Wheeling Steel Corporation, Steubenville, Ohio, stated that gas producer operation should not be under the control of the superintendent of the department which the gas producers serve. The producer department should be separate and under individual and close supervision,

*Power engineer, Pittsburgh plants, National Tube Co., Pittsburgh.

(Continued on page 1829)

Chip Separator for Small Parts

For use in separating chips from finished parts of watches, clocks, optical goods, cameras and instruments, a new separator has been put out by the McKenzie Engineering Co., New Rochelle, N. Y. This is designed not only to handle chips of brass and aluminum, but sawdust adhering to parts after they have been tumbled, etc. The small unit illustrated in the



Chip Separator for Brass, Aluminum and Other Parts Up to 1/2 In. in Diameter and 1 In. Long

photograph is designed for taking parts up to 1/2 in. in diameter and 1 in. long.

Essentially it operates on the blower principle, being driven by a 1/4-hp. motor direct coupled to the blower and taking power from an electric light socket. The instrument is portable. Material is put into the work box on top and pushed into the vibrator through an opening 1 in. by 3 in. Here it is loosened and spread out—the chips being blown through the hood while the finished parts drop into the pan provided for them.

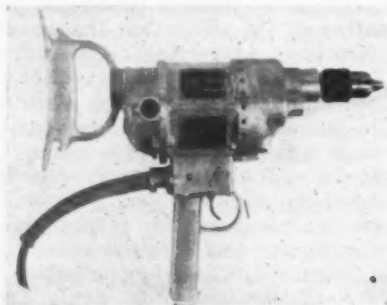
Parts very small and light may be separated by the exhaustor attachment shown in the foreground. The material is placed in the pan and pushed forward under the inlet opening in the elbow. From here the chips are sucked up through the elbow and exhaustor and discharged through the hood, while the finished parts drop through a hole, provided in the bench or portable table, into a box. The machine is said to work so rapidly that it can do the separation, in one minute, of a day's output of a small automatic screw machine.

Dimensions are 14 x 22 in. x 16 in. high, while the weight is 156 lb. net.

Makes a Portable Electric 5/16-in. Drill

The Black & Decker Mfg. Co., Towson, Md., manufacturer of portable electric tools and grinders, has brought out a 5/16-in. heavy portable electric drill. It has the pistol grip and trigger switch and is empha-

Light Weight Is a Feature. The chuck is of the three-jaw, hand-tightening type



sized as exceptionally light, as it weighs 10 1/2 lb. It has a no-load speed of 1400 r.p.m. A three-jaw hand tightening chuck for which no chuck key is required is furnished with it and it takes straight shank drill bits up to 5/16 in.

New Frequency Changer

To permit use of simple induction motors at higher speeds than normal, Forbes & Myers, 172 Union Street, Worcester, Mass., have developed a frequency changer for small motors. An induction motor on 60-cycle current can run at 3600 r.p.m. with only a single moving part. Not so simple are motors of 5400 and 7200 r.p.m., though they are built for use with 60-cycle current. If, however, 90-cycle current is used, a simple 3600 r.p.m. motor will run at 5400 r.p.m. Similarly, with 120 cycles, it reaches 7200 r.p.m. and 14,400 r.p.m. with 240 cycles.

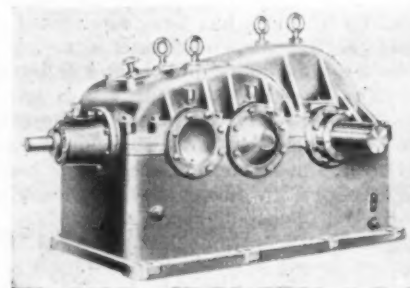
The small frequency changer made by Forbes & Myers gives 240 cycles when operated on 60-cycle current. Used with a standard two-speed motor, it makes a four-speed motor capable of running at 1800, 3600, 7200 and 14,400 r.p.m. The present unit is of 1/2 kva., for a 1/3-hp. motor. Larger sizes will be built, up to 3 kva. for 2-hp. motors.

Spiral Bevel and Herringbone Gear Speed Reducers

A new line of compound spiral-bevel and herringbone gear speed reduction units is being put on the market by the Philadelphia Gear Works, Philadelphia, for service where unusually high speeds are necessary, but where it is impractical to use a water cooling system to keep down the temperature of the unit.

The high-speed shaft revolves in a single and a double-row ball thrust bearing. Upon the end of this shaft is a spiral-bevel pinion, which engages in a spiral-bevel gear. This gear and a herringbone pinion are mounted on the same shaft. Where additional reductions are desired an additional set of herringbone gears and pinions are utilized. Lubrication is by means

Triple Reduction Spiral Bevel and Herringbone Gear Unit. The speed reduction ratio is 200 to 1



of the splash system, and oil plugs are provided for filling, draining and determining of proper oil level. The unit is arranged so that the upper half of the housing can be removed without disturbing the gear mountings, bearings, etc.

The illustration herewith shows a triple-reduction unit, allowing a ratio of from 200 to 1. Double-stage units are also available and permit a reduction ratio up to 36 to 1. Units can be had in horsepower up to 200. The gears are of nickel steel, and heat-treated.

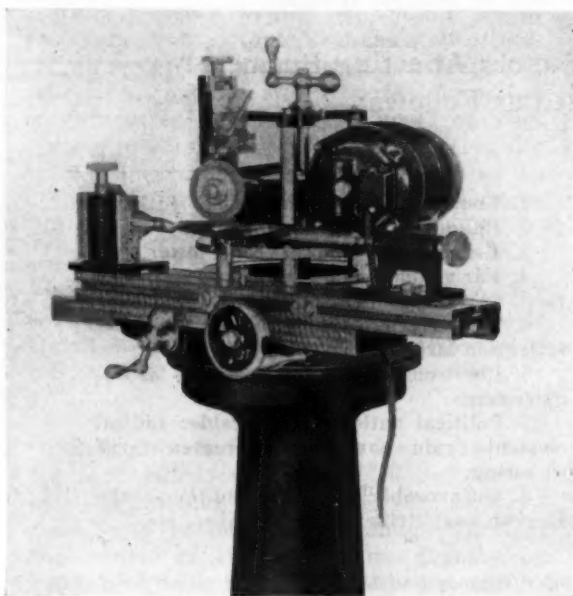
Fewer Mechanical Stokers Sold

Mechanical stoker sales reported by the Department of Commerce, from 12 establishments, showed 129 units in May, aggregating 48,482 hp. This is a sharp drop from the 70,055 hp. in April. It is less also than the 55,588 hp. of May, 1925, although it is above the average month (46,111 hp.) of 1925.

About 90 guests participated in the recent annual dinner of the Veterans' Association of the Farrel Foundry & Machine Co., Ansonia, Conn. The association includes 121 employees who have been with the company for 25 years or more. Their average length of service is 33 years. Addresses were made by Charles F. Bliss, president of the company, and by Rev. Franklin J. Kennedy.

New Machine for Grinding Tools Requiring Clearance Along the Sides

A relief grinding machine with which circular relief grinding of metal cutting tools has been reduced to one operation has been brought out by the Cleveland Tool Engineering Co., Main and West Twenty-fifth Streets, Cleveland. This machine is designed for grinding



Reduction in Cost of Regrinding Cutting Tools Is Attributed to Grinding of the Work in One, Instead of Two or Three, Operations

tapper taps, boiler, bridge and ship reamers, adjustable reamers, milling cutters and other tools that require clearance along the sides.

The face of the grinding wheel is dressed concavely to exactly the same curve of the tool to be ground. This is done with a diamond located above the grinding wheel. The tool to be ground is offset from the center of the curve of the wheel to give the desired clearance, by a transverse movement of the table and the tool is ground to the cutting edge in one operation. This grinding produces a convex surface adjoining the cutting edge, the circular relief being ground to the same curve as has been provided on the face of the grinding wheel. The amount of clearance is determined by the distance the tool is moved in or out against the curved face of the grinding wheel. The convex contour of the relief leaves all the metal possible to support the cutting edge, this it is claimed eliminating chatter and reducing wear of the tool. It is pointed out that the machine permits of significant savings in the cost of regrinding cutting tools, because only one instead of two or three operations is required. Another advantage claimed for it is the precision of the work.

The longitudinal movement of the table is 15 in., the distance between centers is 15 in., and the swing is 5 in. The down feed of the cutting wheel with graduations of a thousandth of an inch is controlled by a handle on the head. The head itself swings, with graduations in degrees, for spiral work. The feed screw and the cross feed are graduated in thousandths of an inch.

The machine is belt driven from a $\frac{1}{4}$ -hp. 1725-r.p.m. motor, which is mounted as shown. The grinding wheel is 4 in. in diameter and is driven at 6250 r.p.m. The spindle is of alloy steel running in dust-proof ball bearings. The over all height of the machine is 4 $\frac{1}{2}$ ft.

Lathes with Driving Motor in the Leg

The Sebastian Lathe Co., Cincinnati, has developed a motor-in-the-leg type of drive for its 15, 18, and 20-in. engine lathes.

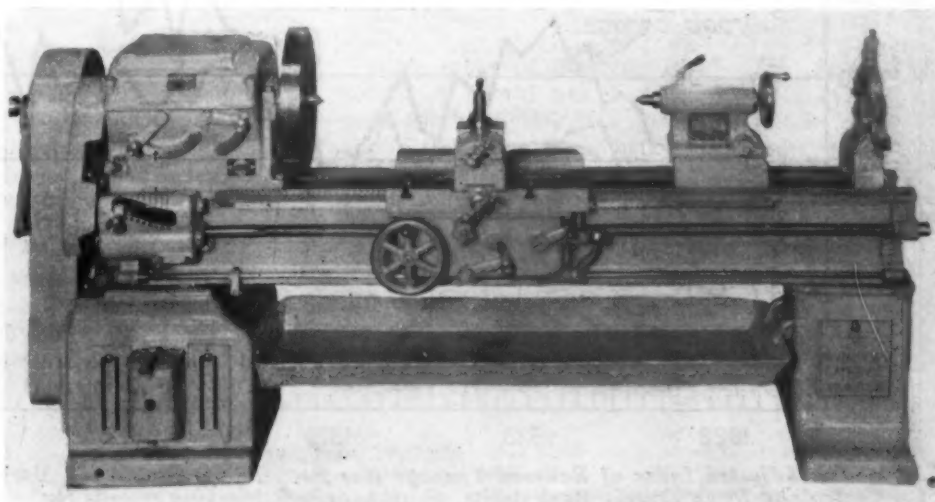
In this drive arrangement the motor is completely inclosed, but may be removed conveniently through the end of the cabinet leg, by removing four screws. There are two doors in the front of the leg and one in the rear. The top of the leg is a solid casting. The drive is provided with a 3-in. double belt for the 15-in. lathe, and a 4-in. double belt for the 18-in. and 20-in. machines. An adjustable idler pulley is provided and the belts are completely guarded. A 3 hp. motor is furnished for the 15-in. lathe and a 5-hp. motor for the larger sizes.

Electric Heat for Tinning Pots

A method of heating sheet metal tinning pots, utilizing electric heat, has been devised by the General Electric Co., Schenectady, N. Y. It is claimed for it that the desired thickness of tin is deposited at all times; that need of attendance is eliminated through automatic control; that loss of tin, through over-heating and excessive oxidation, is minimized and that there is low maintenance and long life, and better working conditions in the shop.

The tin is heated by means of cast-in electric immersion units located inside the pot and automatically controlled. The connected load for the pot is 125 kw. and the hourly consumption is approximately 85 kwhr., giving an average of 4 kwhr. per base box.

The Motor Is Inclosed in the Cabinet Leg and Belted to the Spindle as Shown



Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Favorable and Unfavorable Factors Affecting Business May Be Summarized as Follows:

Favorable Factors

1. The decline in commodity prices has been checked.
2. The decline in unfilled orders has become less rapid.
3. Retail trade shows recovery.
4. Pronounced ease in the money market, with time and call money both considerably below the yield on bonds.
5. The recently resumed upward trend in the stock market.

Unfavorable Factors

1. Continued decline in the P-V Line.
2. Building activity diminishing.
3. Employment and payrolls lower.
4. Farm purchasing power unsatisfactory.
5. The average manufacturer's inventories too large.
6. Pig iron production in excess of requirements.
7. Political outlook unfavorable: radical elements gain power and threaten tariff tinkering.
8. Unfavorable foreign conditions: the English coal strike, French finance, etc.

CHIEF of the favorable factors are the large supply of money and the easy credit situation, taken together with the fact that industrial maladjustments have thus far not been serious. The unfavorable factors are strong enough to indicate that no general recovery in business is to be expected much before autumn. The next upswing is likely to be rather short and sharp and to be followed by a prolonged and drastic recession.

TWO indexes of general business, shown in the first chart, are at present pointing downward. This unquestionably means that the preceding upward trend of business in general has been decidedly checked and that a considerable recession occurred during April and May. No optimistic sentiment or isolated figures, such as car-loading data or the bookings of structural steel, can offset the facts revealed by these more comprehensive indexes.

Some may be surprised at the decline shown in railroad tonnage, as the weekly reports have indicated a continuous increase in the number of cars loaded. The explanation, however, is simple. It lies chiefly

in the fact that the number of tons loaded per car has fallen to a low level. Recently the average has been little over 26 tons per car, while the railroads have long sought to bring loadings up to an average of 30 tons per car, as being desirable practice.

Another point to be remembered with reference to the car loadings is that the increases of recent weeks have been largely seasonal, such as always occur in an average year at this time. Also some allowance should be made for the normal growth of the transportation volume, due to the increase in the country's population and the expansion of its industries. The tonnage curve as shown in the chart is adjusted so as to eliminate

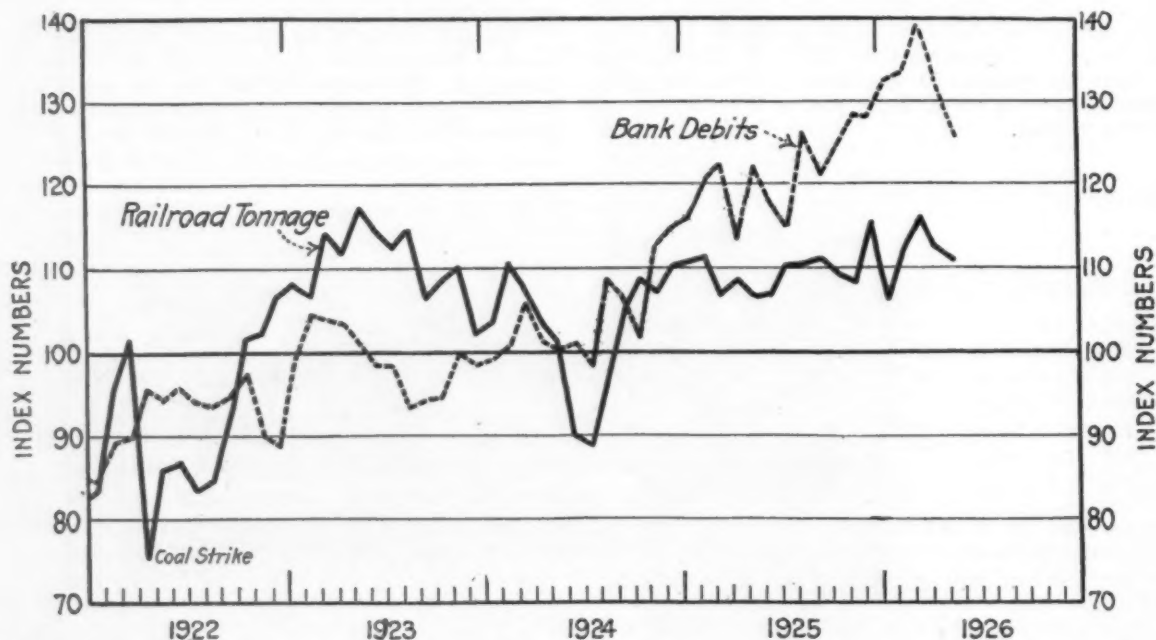


Fig. 1—The Adjusted Index of Railroad Tonnage Has Been Fairly Stable for More Than a Year, But Now Shows a Definite Down Trend. Bank debits, which have been breaking records for several months, now are moving sharply downward

In This Issue

Hand-to-mouth buying is forcing manufacturers to investigate new channels of distribution.—With consumers, retailers and jobbers all cutting stocks to the bone, the manufacturer is obliged to hold the bag. Unable to adjust his production economically to the uncertain demand, he is looking to other distributive channels for relief.—Page 1781.

Can the railroads afford a wage increase?—No, says student of railroad economics. Union demands would increase railroad payroll one-half billion dollars.—Page 1776.

"Rimming steel" is cleaner and welds better than killed or partly killed low carbon steel.—Skinholes, the bugbear of "rimming steel," can be kept to a minimum through the control of the boil in the furnace by oxide of iron and bath temperature, and by controlling effervescence through boil and casting temperatures.—Page 1780.

Is Labor's support of the farmer wholly altruistic?—Perhaps Labor's advocacy of Governmental aid to the farmer is motivated by a desire to discourage the movement from farm to city, as tending at once to increase the supply of labor and to bring about a balance between agriculture and industry.—Page 1803.

Sharp competition is forcing manufacturers to study selling costs more carefully.—The struggle for business has already resulted in lower manufacturing costs and now distributing costs are under scrutiny.—Page 1781.

Automotive vehicles in use in this country now number 20 millions.—17.5 millions are passenger cars, and the remainder trucks, buses, etc. The wholesale value of the automobile industry's output last year is given as 4.2 billion dollars.—Page 1786.

The denser the brick, the better for blast furnace stove use.—Though contrary to the opinion held by some practical men, this can be proved by experiment, says refractory authority.—Page 1788.

Gradual decline in business is reflected in falling off of bank debits and railroad tonnage.—But there is no indication of any long or sharp further recession, says Dr. Haney. Looks for upturn in the fall.—Page 1795.

Simplify the making of good producer gas.—Equipping the producers with the proper measuring and recording instruments will do it, users unanimously agree. The cost is estimated to be between \$500 and \$800 per producer.—Page 1829.

Assessment of countervailing duties on imports of German iron and steel are suspended.—Treasury Department issues suspension order at the request of German ambassador, pending further investigation.—Page 1805.

Steam or electricity for rolling mill drives?—Though data for a scientific comparison of merits are not submitted, both types of drive have their champions at steel electrical engineers' meeting.—Page 1830.

When prices are raised or lowered what is the effect on sales?—Supply the need for adequate data on distribution and "guessing" at future sales volume and "saturation points" will be eliminated, declares speaker at S. I. E. meeting.—Page 1782.

Estimates that 1.5 million motor vehicles were scrapped last year.—As exports totaled 536,741 vehicles, then 2.3 millions of the 4.3 million motor vehicles made last year was added to the total in use.—Page 1786.

Prefers air to water for cooling continuous bloom and billet heating furnace hearths.—Cool the hearth by drawing air for combustion through passages underneath the hearth, Bethlehem steel man recommends.—Page 1789.

Is a further decline in steel output imminent?—P-V forecasting line points that way, says Dr. Haney.—Page 1796.

Who invented barbed wire?—The first patent on record was filed in 1867, but evident birth of the idea in many minds at about the same time makes it nearly impossible to accord any one individual the honor.—Page 1769.

Narrowing of tolerance limits on automobile brake drums presents problem in die-making.—A die has been made which pierces drums sufficiently close to permissible limits to make grinding unnecessary.—Page 1775.

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Helps in Fixing Selling Plans

IN this issue are the "official" returns for finished steel production last year. They replace the estimates which we compiled immediately at the close of last year, in the issue of Jan. 7, 1926. They show that our figures were 1 per cent out in bars, 2 per cent in track accessories, 2½ per cent in tin plate, 3½ per cent in sheets and 4 per cent in plates. That they were that close is surprising, seeing that the producers had to do some estimating for December and some of them reported shipments, while others covered production.

One unique feature of the survey made in our Annual Review and Statistical Number is that besides giving the amounts of various forms of steel made, we allocated the steel in detail to various basic channels of consumption. The year-end tabulations thus serve as a guide to the sales manager to discover promising lines of distribution, and the help that they offer serves to repay in part for the tremendous task accepted by the makers in cooperating with us.

For News Summary See Reverse Side

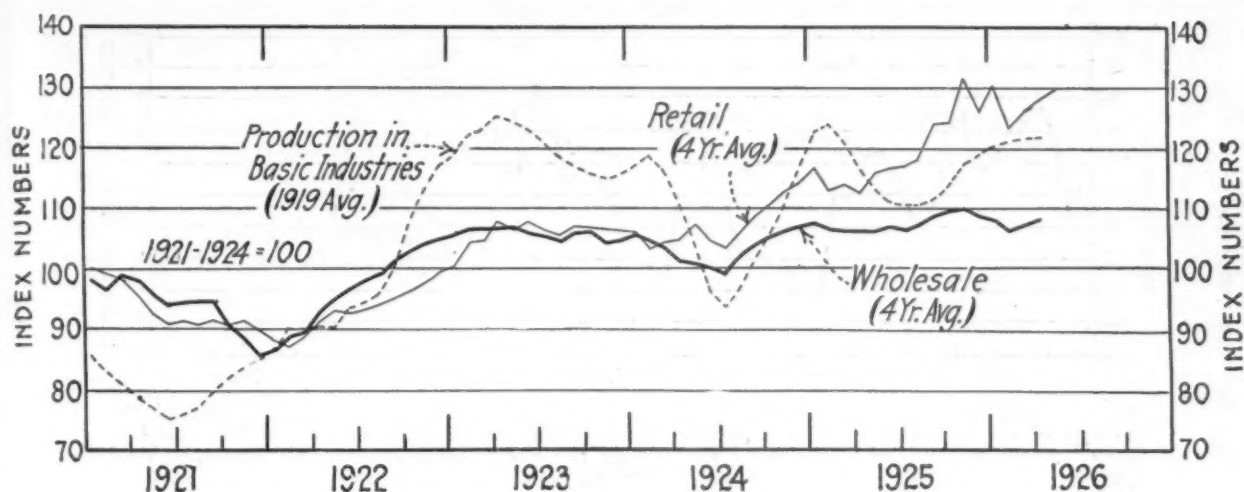


Fig. 2—Retail Trade Volume Is Well Above the Four-Year Average of Production in Basic Industries, Indicating That Consumption Is Still Large. It has long been above wholesale trade. Production appears about ready to turn downward

the merely seasonal changes. The decrease which it shows would be even greater were allowance made for the normal growth factor.

Even as adjusted, it is obvious that the volume of railroad freight traffic still holds around the general level of the last year and a half and may, therefore, be called large. The decline which has occurred since March merely reflects a moderate recession in the general volume of business, which is still under way.

Volume of Bank Debits Still Heavy

THE volume of checks drawn ("bank debits") showed a weekly average during May of \$12,035,000,000, against \$12,602,000,000 in April. The adjusted index registered 125.7 per cent of the average for the four years 1921-25, compared with 132.8 per cent in April. The peak in March was 139.5 per cent. The decline in bank debits, which has roughly paralleled that in railroad tonnage, has been influenced in part by declining commodity prices and in part by the decline in speculative activity in real estate and securities.

Partly, however, it is due to the recession in general business activity, which is to be seen concretely in such industries as building, textiles, coal, shoes, rubber tires and automobile production. Toward the end of last year, and early this year, some overproduction in the general field of manufacturing became apparent and the situation was intensified by the highly abnormal spring season. As a result, rather general curtailment has been forced by declining commodity prices.

The year 1926 will undoubtedly go down in industrial history as one which was strongly influenced by a bad spring season. Whether the unseasonable weather has been due to the prevalence of sun spots or not, the fact remains that nearly all businesses which are affected by the seasons have suffered great injury, a

large part of which will never be made good. Some postponed buying has recently been in evidence, which has caused a spurt in retail trade in a good many lines, but the average consumer, after so long a delay, will be inclined to "get along without" the spring merchandise which he would have purchased under more favorable weather conditions. The backwardness of the shoe trade is a case in point, and the unfavorable effect upon the leather industry illustrates how widespread are the reactions of such conditions.

Business Activity Still on High Plane

ON the whole, however, the general business situation is by no means such as to cause pessimism. The high level of bank debits and the fairly large volume of freight traffic prove conclusively that we are far from depression levels. Both of the curves in the chart are higher than they were in the same month either in 1924 or 1925. We must remember that there have been no great general industrial excesses in the recent past and naturally, therefore, no indication is to be seen of any long or sharp further recession.

Indeed, the current ease in the money markets and the strength of the banking position are such that we may again call attention to the existence of inflationary tendencies. Several times in the past this department has referred to the existence of a race between inflationary tendencies and the over-capacity for production which characterizes a good many of our industries. Abundance of money and credit constantly tends to stimulate speculative activity, while overproduction speedily develops when business expands.

It has become an annual occurrence in recent years for production to be pushed up in excess of requirements toward the end of the year, with a downward readjustment following. Caution and control through

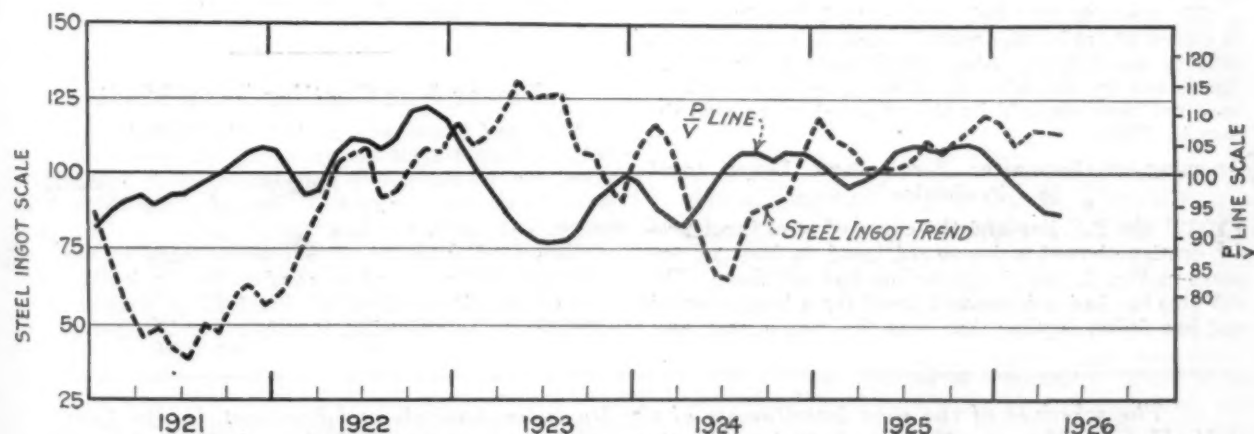


Fig. 3—The P-V Line, Representing the Ratio of Commodity Prices to the Physical Volume of Trade, Generally Anticipates the Trend of Business by About Five Months. It turned downward in December and has continued a steady drop until now it is well below normal. Ingot production probably will decline also

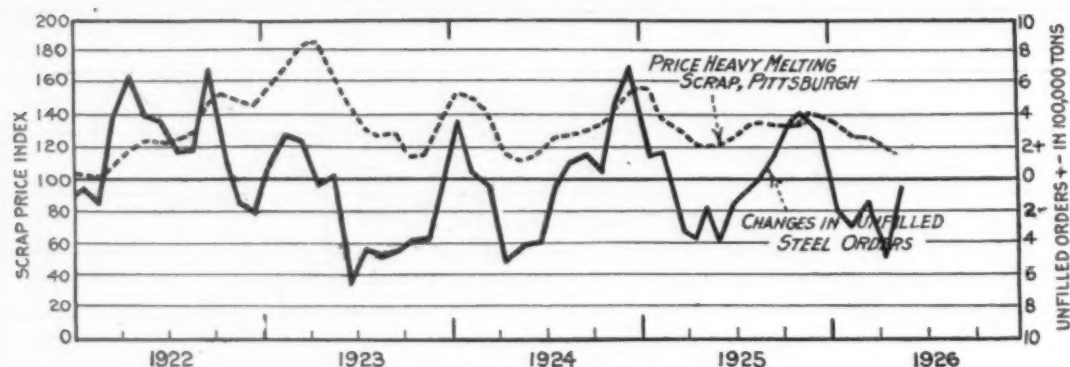


Fig. 4—The Curve Showing the Rate of Change in Unfilled Orders Last Month Reversed the Downward Trend Which Had Been in Evidence for Several Months and Turned Sharply Upward. Scrap prices also are moving up, though the curve, based on monthly averages, does not yet reflect this tendency

the Federal Reserve banks check the inflationary developments which arise in the fall and abundant banking resources prevent a severe recession in the summer. This cutting off of booms and depressions may not go on forever, but as long as it is possible to restrain the excess of over-speculation on the upswings, it is logical to conclude that no prolonged periods of drastic liquidation will be required.

Retail Trade Holds Up Well

OUR second chart shows the trend of trade, both retail and wholesale, and compares this trend with that of production in basic industries. The trends have been smoothed out by using three-month moving averages.

A glance at the chart makes it clear that there was some recovery in trade during May, but that production in basic industries is about to turn downward, the increase having been checked in April and there being reasonable certainty that May figures, when available, will show a considerable decrease. Both retail and wholesale trade reached a peak toward the end of last year and then declined. This drop was due partly to a very unfavorable spring, and accordingly the more seasonable weather of late has resulted in a partial recovery of the ground lost during March and April. In fact, it may well turn out that the upturn in May trade was a temporary spurt based on purchases which had been delayed by the lateness of the season.

The greatest interest in the second chart, however, lies in what it shows about the relative levels of production and trade. In the first place, it is clear that production in basic industries is relatively high compared with wholesale trade, but is still below the level of retail trade. The large volume of retail business has for a long time been one of the most favorable indications concerning business, the activity of mail order houses and various retail chain stores having been particularly notable.

In the second place, retail trade has for a long while been much above wholesale trade.

We conclude that industrial output is only a little in excess of trade requirements—not so much so as in 1923 or early 1925. Also, retail trade has not been threatened by excessive inventories, in that retailers have not been oversold by the wholesalers, as was the case in 1923.

Dropping of Barometer Foreshadows Lower Ingot Production

BOTH the P-V line and the curve of steel ingot production showed a downward trend in May, as appears in Fig. 3, though the decline was not sharp. The P-V line has had a downward trend for a longer period and has fallen further than was the case a year ago.

On the other hand, the ingot output has held up better than it did last year and May found it considerably higher than in the same month of 1925. Steel production has as usual followed the direction of the P-V line barometer, but not to the same extent as in some of the earlier years.

In the three years 1921 through 1923 the P-V line led ingot production by from 5 to 6 months, while in the years 1924 and 1925, inclusive, the lead was shorter and the swings less violent.

Our experience with this barometer has not been sufficiently long to enable us to say with confidence what the exact lag between the barometer and ingot production is likely to be. If the experience of the earlier years is to be repeated there will be a continued decline in ingot production for several months and it will be more sharp than it has yet been. But if more recent years are to be the pattern, ingot production may show less response. In view of the current downward trend in building activity and automobile production (two of the heavier steel-consuming industries) it seems reasonable to look for considerable further recession in ingot production, which will be greater than usual for the season and which will last through August, with the outlook beyond that month still uncertain.

Scrap Prices and Unfilled Orders

THE course of steel scrap prices and that of unfilled orders show divergent trends (see Fig. 4). The divergence, however, is more apparent than real, for the reason that scrap prices as charted are monthly averages and do not show the recent upturns. Thus, heavy melting steel at Pittsburgh averaged \$15.69 in May, while in the week of June 15 the price was \$16. In short, the trend of both barometers is at least temporarily upward.

The rate of change in the unfilled orders of the United States Steel Corporation gives a favorable indication concerning the steel business. Its upward trend reflects the less rapid decrease in unfilled orders and indicates that sales must have picked up in May.

Fewer But Costlier Pens Made

Steel and brass pens made in the United States in 1925 numbered 1,751,489 gross, according to data collected by the Bureau of the Census. This is slightly more than 2 pens per capita. The value was \$1,206,837, or 69c. per gross, at plant.

Compared with the 1923 census, there was a decrease of 10.2 per cent in number but an increase of 8.9 per cent in total value. In 1923 production was 1,950,057 gross, valued at \$1,108,424, or 57c. per gross.

The schedule of the next installments of the *Business Analysis and Forecast*, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, is as follows: July 15—Activity in Steel Consuming Industries; July 22—Position of Iron and Steel Producers; July 29—General Business Outlook.

SHEET PRODUCTION AND SALES

Shipments and Production Balance in May—
Sales Off from April

Production of 710 independent sheet mills, according to figures just issued by the National Association of Sheet and Tin Plate Manufacturers, amounted to 264,541 net tons in May, 1926, while shipments totaled 267,299 tons and sales were 201,743 tons. Unshipped stock totaled 120,036 tons and unsold stocks were 58,503 tons. These figures represent substantial increases when compared with May of last year but reflect declines when compared with figures for April, although for the latter month there were 711 reporting mills. The 710 mills for May had an approximate capacity of 420,300 tons and reports were received from plants representing 74.8 per cent of that capacity. The figures in detail follow:

	1926			1925
	May	April	March	May
Total number of mills	710	711	712	699
Sales	201,743	249,866	304,233	186,538
Production	264,541	294,811	319,133	260,470
Shipments	267,299	288,759	320,623	232,372
Unfilled orders	418,582	472,488	534,641	399,330
Unshipped stock	120,036	121,685	111,948	81,462
Unsold stocks	58,503	62,604	61,433	52,051
Percentages of Capacity				
Sales	64.3	77.1	89.8	62.3
Production	84.3	91.0	94.2	87.0
Shipments	85.1	89.1	94.7	77.6
Unfilled orders	133.4	145.7	157.9	133.4
Unshipped stock	38.2	37.5	33.1	27.2
Unsold stocks	18.6	19.3	18.1	17.4

High Castings Sales Continue

Bookings of commercial steel castings in May, as reported by the Department of Commerce, amounted to 79,003 net tons, compared with 86,826 tons in April and 104,950 tons in March, and with 63,827 tons in May, 1925. Railroad specialties accounted for 31,318 tons last month, or 53 per cent of capacity; miscellaneous castings, for 47,685 tons, or 66 per cent of capacity.

For the first five months, bookings this year have been 21 per cent ahead of last year. The gain was from 389,122 tons to 470,329 tons. Both classes of castings contributed to the increase, railroad specialties having advanced 17 per cent, from 167,504 tons to 195,331 tons, and miscellaneous castings 24 per cent, from 221,618 tons to 274,998 tons.

Shipments are running well ahead of orders. For May, 95,734 tons was shipped, and for the five months, 492,781 tons, or 75 per cent of capacity.

Changes Name to Kettlewell Co.

The Michigan Pattern & Machine Co., 3429-39 East Jefferson Avenue, Detroit, has changed its name to the Kettlewell Co., with Richard Kettlewell, founder and former general manager of the old concern, as president. Mr. Kettlewell, after a temporary retirement from business, recently spent several months in England, France and Austria studying industrial conditions. He began his career as an apprentice pattern maker in 1899. For four years he was superintendent of the assembly of the Ford Motor Co., and later took charge of the pattern and foundry division of Dodge Brothers.

With the announcement of change in name Mr. Kettlewell announces the appointment of Albert B. Machon, formerly of the Packard Motor Car Co., as supervisor of the pattern division, and of Charles W. Trombly, formerly superintendent of the Motor City Tool Co., as supervisor of the machine division.

The Cleveland Engineering Society, Cleveland, which has for some time occupied quarters in the Winton Hotel, will move June 30 to enlarged quarters on the top floor of Carnegie Hall, 1220 Huron Road, that city.

EXPORTS BEAT LAST YEAR

Iron and Steel Shipments in Five Months 23 Per
Cent Above 1925—Imports Heavy

WASHINGTON, June 22.—Exports of iron and steel products from the United States in May are reported by the Department of Commerce at 173,418 gross tons, compared with 194,449 tons in April and with 150,612 tons in May, 1925. For the first five months the total has been 869,077 tons, or a gain of 23 per cent over the same period of 1925. For the 11 elapsed months of the fiscal year the total has been 1,789,354 tons, compared with 1,510,177 tons in 11 months last year and with 1,663,084 tons in the entire 12 months ended June 30, 1925.

Imports in May were 108,731 tons, a slight increase over the 107,636 tons of April and the highest figure since January, 1923. In May, 1925, the total was 67,789 tons. Imports in five months have been 488,754 tons, against 406,048 tons last year. More than one-half, this year, was pig iron—275,054 tons. Steel bars, at 40,637 tons, made the next item, followed by structural shapes, 33,810 tons.

Details, with the usual tables, will be published in THE IRON AGE next week.

Structural Steel Sales Advance

Bookings of fabricated structural steel in May, reported by the Department of Commerce, show a computed total of 234,850 tons, or 77 per cent of capacity. This compares with 219,600 tons and 72 per cent in April, with 207,400 tons and 68 per cent in May, 1925, and with 183,000 tons and 60 per cent in May, 1924.

For five months, bookings of 1,024,800 tons are slightly above 1925, with 1,000,400 tons, and 1924, with 1,006,330 tons.

Shipments have exceeded bookings every month since October. For May, shipments were 237,900 tons, against 244,000 tons in April and 247,050 tons in March. May shipments last year were 231,800 tons. In May, 1924, the total was 216,550 tons. For five months, shipments this year, at 1,131,550 tons, were well above the 1,049,200 tons of 1925 and 978,350 tons of 1924.

Wholesale Prices Slightly Up

For the first time in several months, the wholesale price of all commodities, reported by the United States Bureau of Labor Statistics, shows an increase. For May, the figure is 151.7, compared with 150.1 in April, and with 155.2 in May, 1925. A considerable increase in fuel, together with slight increases in foods and chemicals, accounted for the result. Most of the changes, both up and down, were fractional, although both metal products and building materials dropped by more than one point.

Metals and metal products continue to hold the lowest position of all the major groups, at 125.2, compared with 126.5 last month. Fuels at 178.7 form the highest item; clothing materials at 176.1 and building materials at 171.6 are next highest.

New Fabricating Shop at Pulaski, Va.

A plant for the fabrication of light plate and light structural material will be erected by Arthur G. McKee & Co., Cleveland, at Pulaski, Va., adjoining the plant of the Pulaski Foundry & Machine Corporation, which is owned by this firm. The new plant will be used for the manufacture of scale, transfer and other cars, as well as other equipment required in blast furnace and construction work done by McKee & Co. Other fabricating work will also be done. However, the report that the company will erect a rolling mill for structural material is incorrect. The plant will be operated under the name of the Pulaski Engineering Works.

FABRICATED STEEL

Week's Awards Close to 37,000 Tons—Chicago Building Takes 7200 Tons

In the week following announcement by leading mills of an advance of \$2 a ton on structural shapes the aggregate of awards of structural steel buildings was close to 37,000 tons, on a par with the preceding week and approximately the same amount that was reported in THE IRON AGE for the third week of June last year. Inquiries totaled more than 12,000 tons. The largest job awarded was a Chicago office building, calling for 7200 tons. Awards follow:

ALLSTON, BOSTON, 150 tons, Mack Motor Truck Co. plant, to New England Structural Co.

POUGHKEEPSIE, N. Y., 2000 tons, caissons for the Hudson River bridge, to Staten Island Shipbuilding Co.

LOCKPORT, N. Y., 130 tons, Y. M. C. A. building, to Leach Steel Corporation.

NEW YORK, 1000 tons, public schools Nos. 52 and 73 in the Borough of Queens, to Bethlehem Fabricators, Inc.

NEW YORK, 350 tons, office building at Canal and Forsythe Streets, to Hinkle Iron Works.

NEW YORK, 800 tons, building on East Twenty-first Street for Ed. Pinaud, to Hay Foundry & Iron Works.

NEW YORK, 2000 tons, New York Central viaduct at Fordham Road, to McClintic-Marshall Co.

NEW YORK, 800 tons, apartment building at Madison Avenue and Fiftieth Street, to A. E. Norton, Inc.

BROOKLYN, 1250 tons, building for Brooklyn Edison Co. at Willoughby and Pearl Streets, to Hedden Iron Construction Co.

BROOKLYN, 500 tons, building for Bureau of Charities, to Hedden Iron Construction Co.

BROOKLYN, 450 tons, public school No. 91, to Easton Structural Steel Co.

LONG ISLAND CITY, N. Y., 250 tons, warehouse, to American Bridge Co.

WEST NEW YORK, N. J., 350 tons, school building, to Oltmer Iron Works.

TRENTON, N. J., 250 tons, building for local fire department, to American Bridge Co.

PHILADELPHIA, 150 tons, building for United Gas Improvement Co., to American Bridge Co.

PHILADELPHIA, 1600 tons, University of Pennsylvania stadium, to Shoemaker Bridge Co.

EDDYSTONE, PA., 275 tons, addition to plant of Baldwin Locomotive Works, to McClintic-Marshall Co.

PENNSYLVANIA RAILROAD, 600 tons, bridges, to American Bridge Co.

READING, PA., 450 tons, building for Textile Machinery Co., to Lehigh Structural Steel Co.

ALLENTOWN, PA., 150 tons, boiler house, to Belmont Iron Works.

CHDARTOWN, GA., 1400 tons, mill building for Goodyear Tire and Rubber Co., to Burger Iron Works.

JACKSONVILLE, FLA., 1000 tons, theater and office building, to an unnamed fabricator.

TORONTO, OHIO, 3000 tons, power plant for Ohio River Edison Co., to Jones & Laughlin Steel Corporation.

CINCINNATI NORTHERN RAILROAD, 168 tons, bridge, to McClintic-Marshall Co.

FRANKLIN, OHIO, 100 tons, building for Aetna Paper Co., to Dayton-Whirley Co., Dayton.

CLEVELAND, 450 tons, Pearl Street Temple, to Massillon Bridge & Structural Co.

HUNTINGTON, W. VA., 100 tons, International Nickel Co., factory building, to Fort Pitt Bridge Works.

PITTSBURGH, 10 barges, 1600 tons, for Hillman Transportation Co., to American Bridge Co.

LOUISVILLE, 200 tons, Crescent Hill Baptist Church, to Snead Architectural Iron Works Co., Louisville.

INDIANAPOLIS, 600 tons, building for Citizens Gas Co., to Insley Mfg. Co., Indianapolis.

PAINES, MICH., 275 tons for highway, Michigan Highway Department, to American Bridge Co.

MILWAUKEE, 180 tons, Colonial Theater, Fifteenth and Vliet Streets, to Lakeside Bridge & Steel Co.

CHICAGO, 7200 tons, Bankers' Building, to American Bridge Co.

CHICAGO, 1950 tons, Lake-State Bank Building, to Gage Structural Steel Co.

GARY, IND., 175 tons, Horace Mann public school, to unnamed bidder.

KANSAS CITY, MO., 2000 tons, Loew Theater, to J. Goldberg & Son, Kansas City.

IDAHO, 100 tons, bridge over Spokane River, to Illinois Steel Bridge Co.

SANDPOINT, IDAHO, 506 tons, State bridge across Pend d'Oreille River near Newport, Wash., to Virginia Bridge & Iron Co.

CUSTER COUNTY, IDAHO, 100 tons, bridge, to Vincennes Bridge Co.

SUMNER, WASH., 150 tons, Northern Pacific bridge, to American Bridge Co.

TACOMA, WASH., 375 tons, Northern Pacific bridge, to Mount Vernon Bridge Co.

TACOMA, WASH., 1500 tons, municipal pipe line, to Steel Tank & Pipe Co., Portland.

LA MESA, CAL., 100 tons, pipe line for Lemon Grove & Spring Valley Irrigation District, San Diego County, to Lacy Mfg. Co., Los Angeles.

SAN FRANCISCO, 100 tons, Pacific Gas & Electric Co., for Philbrook Reservoir, Pitt River project, to Steel Tank & Pipe Co., of California, Berkeley, Cal.

OAKLAND, CAL., 100 tons, Woodrow Wilson School, to Judson Mfg. Co.

OAKLAND, 120 tons, building for Oakland Scavengers' Association, to Judson Mfg. Co.

OAKLAND, 100 tons, dredge pipe for city work, to Pacific Coast Engineering Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

MASSACHUSETTS, 300 tons, building for Berkshire Life Insurance Co.

ROXBURY, BOSTON, 105 tons, theater and stores.

NORTH ADAMS, MASS., 100 tons, bridge.

ESSEX, VT., 100 tons, bridge.

NEWBURGH, N. Y., 800 tons, building for the Newburgh Free Academy.

BUFFALO, 300 tons, building for Semet-Solvay Co.

NEW YORK CENTRAL, 600 tons, bridges.

READING RAILROAD, 200 tons, bridges.

HAVRE DE GRACE, MD., 1000 tons, power station; Stone & Webster, general contractors.

LACKAWANNA, N. Y., 400 tons, gas holder for Bethlehem Steel Corporation.

SAGINAW, MICH., 200 tons, highway bridge over Tittabawassee River; bids in.

CLEVELAND, 200 tons, girls' school for Sisters of Notre Dame.

DAYTON, OHIO, tonnage unknown, buildings for Delco Light Co.; Shenck & Williams, Dayton, architects.

YOUNGSTOWN, 1200 tons, Montgomery Hotel, for Pythian Hotel Co.

SULLIVAN, IND., 250 tons, Sullivan County Courthouse; bids close July 7.

LOUISVILLE, 300 tons, three maneuver boat hulls and derricks for United States Engineers; Charles Hegewald & Co., New Albany, Ind., low bidder.

LOUISVILLE, 800 tons, Ohio River lock and dam No. 53; bids to be submitted to United States Engineers, P. O. Box 72, Louisville, by July 15.

GAINESBORO, TENN., 400 tons, highway bridge; bids in.

MEMPHIS, 200 tons, steel hull for concrete mixing plant for Mississippi River Commission, First and Second districts; bids close July 9.

KNOXVILLE, TENN., 500 tons, hotel.

ST. LOUIS, 600 tons, five pile-driver hulls for United States Engineers.

ST. LOUIS, 150 tons, towboat for United States Engineers.

LA MESA, CAL., 1450 tons, pipe line for the Lemon Grove & Spring Valley Irrigation District.

CLARK'S FORGE, WASH., 660 tons, bridge in Bonner County near Clark's Forge; bids in.

SAN PEDRO, CAL., 900 tons, 1,500,000 cu. ft. gas holder; bids in.

Railroad Equipment

The Fruit Growers Express has ordered 400 car underframes from the Ryan Car Co.

The Wabash is inquiring for 40 caboose cars.

The Seaboard Air Line has ordered 20 all-steel passenger cars from the American Car & Foundry Co. and 7 dining cars from the Pullman Car & Mfg. Corporation.

The New York Central is expected to inquire soon for about 20 locomotives.

W. D. Harvie, secretary Vancouver Harbor Commissioners, Vancouver, B. C., will receive bids until July 10 for two 6-wheel switching steam locomotives.

DISCUSS MATERIAL TESTING

Early Sessions of Testing Engineers' Meeting— New Committee Elections

ATLANTIC CITY, N. J., June 22.—With a registered attendance 25 per cent larger on its first day than a year ago, indications point to one of the most successful annual conventions the American Society for Testing Materials has ever held. President W. H. Tutweiler opened the meeting this afternoon at Haddon Hall, congratulating the society on the prospects and the enthusiasm.

Two valuable papers on cast iron and two important ones on magnetic testing, besides committee reports, were listened to by a large audience at the first session this afternoon.

The committee meetings have been in full swing since yesterday noon, all largely attended. This evening the annual address of the president is being delivered on the subject "The Importance of Little Things in the Standardization of Methods of Testing," followed by some committees' reports and papers on new testing methods.

Committee A-1 on steel held a largely attended meeting this noon at which J. B. Young, Philadelphia & Reading Railroad, Reading, Pa., was elected chairman. F. M. Waring, who has served so acceptably six years, declined to continue. Committee A-3 on cast iron this morning designated Dr. Richard Moldenke and Walter Wood as honorary chairman and vice-chairman, respectively, in recognition of their meritorious services, and elected R. S. MacPharran, Allis Chalmers Mfg. Co., Milwaukee, as chairman and J. Lowery, vice-chairman.

Wednesday morning the steel session will be held with steel and other sessions scheduled for the next three days. The new president and vice-president were inducted into office this afternoon.

Report of Executive Committee

The membership of the society has finally reached a total of 4000, according to the annual report of the executive committee which is being presented this evening, together with the presidential address and reports of administrative and other committees. The net increase in membership for the year ended with this session is 284. This compares with a net increase last year of 235 and with one of 241 for 1924. In the past year 535 members were elected.

Marked activity characterized the work of nearly all of the standing committees during the past year. Since the last annual meeting, two new committees have been organized, one on material for electrical heating and another on natural building stone. These two new committees bring the total number of standing committees to 45. Most of these are presenting reports during the week's meetings. There are at present 447 standards and tentative standards of the society and these will be increased if the recommendations of the various committees at this session are approved.

The plan of holding group meetings of various committees, which was initiated about three years ago, was continued during the year. Two of these were held, one at Cleveland, Oct. 27-29 (*THE IRON AGE*, Nov. 5, 1925) and the other at Providence, R. I., March 17-19 this year (*THE IRON AGE*, March 25). Leading features of these meetings were published, in the issues of *THE IRON AGE* referred to. The committee states that it is desirable to continue, if possible, the plan by which the fall and spring meetings of these committees are alternated between the West and the East.

Research Activity Broadened

The development of research in materials under the auspices of the society, and the study of means by which the society's activities in promotion of knowledge of engineering materials may best be advanced, are going forward steadily under the guidance of committee E-9 on correlation of research, organized primarily for that purpose, two years ago, says the report. On the initiation of this research committee, two committees were organized in the year: a research committee on the

effect of tin and arsenic on high-speed tool steels and a research committee on the yield point of structural steel.

The special committee promoting the usefulness of the society's work, under the chairmanship of Vice-President J. H. Gibboney, continued during the past year its study of means by which this could be expanded in various ways. It is still considering means by which the work of the society may be made more widely known to the buying and selling public, and the small consumer especially may more greatly benefit by the standardization work of the society than is apparently the case at present. Other matters have been recommended to the executive committee and most of these have been approved and are being put into effect. These include publicity; technical schools, among which an effort is being made to extend knowledge of the society's work among such schools in the United States and Canada; student membership; survey of the extent of the use of A.S.T.M. standards and certification of conformity with A.S.T.M. standards.

Marburg Lecture and Dudley Medal

The committee's report states that the Dudley medal and the Marburg lecture, authorized at the annual meeting a year ago, are in the course of being established. The required sum of \$7,500 is being raised by a special committee on the medal and lecture fund and it is hoped that the report of this committee this week will show the entire sum raised.

The first Edgar Marburg lecture is to be delivered tomorrow afternoon by Prof. A. N. Talbot, past president and honorary member of the society, and the technical papers, which are being presented at the various sessions this week, will be reviewed for the award of the Dudley medal at the annual meeting next year.

New Officers

The new officers of the society, whose election was formally announced Tuesday evening, are:

President—J. H. Gibboney, chief chemist Norfolk & Western Railway Co., Roanoke, Va.

Vice-President—G. W. Thompson, chief chemist National Lead Co., 105 York Street, Brooklyn.

Members of the executive committee—Cloyd M. Chapman, consulting engineer, 105 West Fortieth Street, New York; W. F. Edwards, director of research United States Testing Co., Inc., 316 Hudson Street, New York; W. B. Price, chief chemist and metallurgist Scovill Mfg. Co., Waterbury, Conn., and H. T. Shelley, secretary and manager Eastern Clay Products Association, 906 Colonial Trust Bldg., Philadelphia.

A report of the leading features of the sessions will be published in *THE IRON AGE* next week.

Westinghouse Expects Good Business

At the annual meeting of stockholders of the Westinghouse Electric & Mfg. Co., East Pittsburgh, President E. M. Herr said that business probably would maintain a satisfactory level during the ensuing year and that an increase in radio business over that of last year was indicated. President Herr stated: "Business, on the whole, is rather better than was expected and is on the same basis as last year. Our company has maintained a level volume and now has a satisfactory load for its facilities."

The following directors were re-elected: F. A. Merrick, vice-president and general manager Westinghouse Electric & Mfg. Co.; R. B. Mellon, president Mellon National Bank, Pittsburgh; George M. Verity, president American Rolling Mill Co., Middletown, Ohio, and Jerome J. Hanauer, Kuhn, Loeb & Co., New York.

The June number of the *General Electric Review* is known as the Steel Mill Issue. It contains several articles on the properties of iron and steel and the drive and control of steel mill machinery. Wire rod mills, cold rolling of strip steel and synchronous motors for main roll drives are among the features covered.



BOOK REVIEWS



Metal Spraying. Origin, Development, and Applications of the Metal-Spray Process of Metallization. By T. Henry Turner, M. Sc., and N. F. Budgen, Ph.D. Pages 175, 6 x 8½ in., illustrations 165. Published by Charles Griffin & Co., London. Price, \$6.50.

This is a very thorough and capable study (incidentally, worthy of better illustrations) of this question, treating this modern method of "metallization," so largely due to the Schopps, father and son.

Jet and spray apparatus are coming into their own. Beginning with the Tilghman sand blast, we now have the artist's air brush, the spray painting apparatus, the cement gun, the pulverized-fuel blast, the pressure oil burner, *Et id genus omne*; and now we have spray utilized for coating both metallic and non-metallic surfaces, plane or complicated, with finely divided metal, replacing to some extent, and in many cases advantageously, "galvanizing" and giving "something new and strange" in the aluminum screen for the movies.

The spray method forms an even metal coating, that in most cases is advantageous.

The crude attempts at pulverizing molten metal, both mechanically and by jet, and leading up to the so-called "pistol," and the more elaborate apparatus for work on large and irregular objects, on the sand-blast principle, having a gas heater at the nozzle, not forgetting the gas operated spray, in which hot powdered metal is projected by a form of pistol upon the surface to be coated, are described in detail.

Comparison is made between the metal spray process and other methods of metal coating, miscalled metallization: bronzing, both with bronze paste, and by projecting powdered bronze against a heated metal surface; Sheffield plating, in which a thin sheet of noble metal is joined to a thicker one of base metal by heating and rolling; tinning in a molten bath; so-called galvanizing, Sherardizing, by which articles of iron or steel are heated in a rumbling barrel in contact with zinc powder and zinc oxide; calorizing, in which the surface of an aluminium alloy is formed upon either ferrous or non-ferrous metal by placing the articles in a tight retort, partly filled with finely divided aluminium suspended in aluminium oxide, and subjected to high temperature for several hours; electroplating; chemical metallization, by which pure metals are reduced by chemical means from their salts or other compounds, either in solution or in the dry state (an interesting example being the coppering of carbon brushes for dynamos and electromotors); and the treatment of porous ceramic articles by the application of an alkaline solution of silicates, to the surface, and combining this in a solution of silver chlorides.

There is an alphabetical index of persons mentioned in the book, and another of other proper names. Altogether, the book is highly commendable as a thorough study of the development and practical application of an interesting and valuable process.

ROBERT GRIMSHAW.

Fuel. Edited by G. W. Andrew, M.Sc., F. I. C., aided by specialists and with foreword by H. R. H. the Prince of Wales, and introductions by Sir Eric Geddes and Sir Robert A. Hadfield. Pages 208, 7¼ x 9¼ in.; tables 97. Published by Ernest Benn, Ltd., London.

This work is one of twelve forming the "Resources of the Empire Series," passing in review the material resources of the British Empire and constituting, as it were, a stock-taking of an empire embracing more than one-fourth of the land area of the world, and a corresponding proportion of its inhabitants—in fact, in the latter particular outnumbering the United States about 4½ to 1.

In the words of Sir Eric Geddes, it gives information not only as to valuable supplies of raw materials but as to the quality of these supplies produced in dif-

ferent parts of the Empire, and the amount of undeveloped resources, the transportation facilities, the local labor conditions, etc., and the chances of present supplies available for import into Great Britain being absorbed in the near future by local demands.

This report shows the possibilities of a self-supporting Empire—when the Overseas Dominions get greater purchasing power by development of their great natural resources. The problem is two-fold, for the tropical and the non-tropical countries of the Empire.

This particular volume, dealing with fuels, is one of the most important of the series, as the supply and utilization of that basic unit of modern life affects the economic welfare of both Great Britain and the other countries of the Empire. Hadfield calls attention to the fact that the heat lost in the high-temperature processes in industry far exceeds in actual thermal units that utilized in the products heated; which points to the necessity of developing low-temperature processes.

In the second section Prof. Louis considers coal, lignite and peat in all countries of the Empire where they are found; and also carbonization, the synthetic processes, and the use of waste carbonaceous materials. The coal classification employed is that of the International Geological Congress of 1913; but that of the Imperial Resources Bureau is given also, this latter being according to the uses to which the coal is put.

Section III (Eastlake) treats of fuel oils all over the Empire. We note the paragraphs on shale oil. There is plenty of oil shale in Scotland, also in Canada and other British countries. In Canada the yield is about 40 British gallons to the gross ton.

Section IV (Ormandy) is devoted to power alcohol. In petroleum the Empire is at a disadvantage, as the United States and Mexico produce 80 per cent of the world's total output of crude oil; hence the desirability of finding a substitute within her own confines. The portion of this section that is of interest to us is that concerning the synthetical process of Bury and Ollander, using as the starting point the ethylene (C₂H₄) contained in coke-oven gases, which yields 1½ British gallons per gross ton of coal. This alcohol has only about two-thirds the heating power of petrol (gasoline).

ROBERT GRIMSHAW.

Power Plant Machinery. Vol. II. Details and Accessories. By Walter H. James and Myron W. Dole. Pages 267, 4½ x 7½ in., illustrations, 250. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price, \$3.

In this volume the various parts of reciprocating steam engines are described in detail, turbines more thoroughly treated than in Vol. I, and the various auxiliaries of steam plants are taken up on account of their operative principles or their purposes; the whole making the second part of what is intended to be a connecting link between mechanism as such and heat engineering.

The various losses of energy in steam engines are named, and the methods of lessening them given, the uniflow type naturally being given special consideration. Regrettably, the authors speak of the "head" end of an engine cylinder (modern usage inclining to the use of "out"); while many will not agree with the authors in limiting the term "crankshaft" to one with the crank proper forged integral with the shaft. The Laird crosshead is unmentioned; as are the Sweet packingless stuffing box and the important Bollinckx method of constructing large jacketed cylinders by making the jacket in a separate single-flanged casting and pressing it hydraulically over the single-flanged cylinder proper.

The comparison of the modern steam turbine with the Corliss Centennial enormity is unfair, as the latter, nominally 1400 hp., seldom was able to deliver more

than 450. There is mention neither of the Worthington duplex pump, nor of that compressor type (the Sigaudy) intermediate between the piston and the plunger systems, and used in making coal briquettes, which at a desired predetermined pressure changes automatically from the one to the other system.

G.

Die Windzuführung beim Konverterfrischprozess (Air Supply in the Converter Process). By Dr.-Ing. Hayo Folkerts. Pages 160, 7 x 10 in., illustrations 58, tables 34. Published by Julius Springer, Berlin.

The best possible review of this work would be based on the preface, which calls attention to the important fact that while Bessemer—perhaps he alone—handled the thermo-chemical side of the topic off and thoroughly, the physical side has been only incidentally taken up, unless, perhaps, we consider Trinks' experiments with a converter filled with mercury, in order to ascertain the influence of various elements of the air blast upon the contents.

Progressing from the influence of the blast of air (or gas) on the iron bath, with varying proportions of kinetic energy, to the agitation of the bath and the arrangement of the tuyeres, Prof. Folkerts considers the effect of height of the latter upon the power consumption, their number and diameter, and calls for abandonment of empirical experiments, and for proper research concerning these factors. Very complete tables answer this question.

He next takes up the occurrences in the bath, and gives a diagram showing the condition of the air and combustion gases in their path through tuyeres, bath and converter top. Those of us who remember Holley's "two messes and one blow" phrase will appreciate the value of such detailed analysis, based on calculations and tests.

Using Saint Venant's and Weisbach's formulas for flow quantity through frictionless tuyeres, he obtains a curve diagram and a table for the necessary air flow with a given pressure and drop, finding for example for an initial temperature of 67 deg. C. the ratio between the static pressure in the room from which the air enters the tuyeres and that into which it is forced to be 0.528; this constant to be multiplied by various quantities from 1.08 down to 0.955 for initial temperatures of 20 deg. to 100 deg. C.

Chapter IV gives the results of various experiments to determine:

(1) For tuyeres of various diameters and lengths, the air delivery per sq. cm. of free cross section, with different pressure drops under practical conditions.

(2) The total power consumption, the friction in the tuyeres, the exit velocity of the blast.

(3) The power consumed in agitating the bath, under different quantities of blast and methods of delivery, with various amounts of product. The records, tabular and diagrammatic as well as purely textual are exceedingly full and valuable.

Chapter V is devoted to so-called "empty tests"—following those with full converter. Here the data, diagrammatic and tabular, are exceedingly rich and valuable.

Altogether, the volume is a welcome contribution to converter literature, Bessemer, Thomas and other.

How to Buy and Use Fuel Oil. By Stephen O. Andros, A. B., E. M., former assistant professor of mining research, Engineering Experiment Station, University of Illinois. Pages 127, 5 x 7½ in.; with 40 figures and 11 tables. Published by the Haupt Publishing House, 4623 Schubert Avenue, Chicago.

Mr. Andros offers an apology for this popular treatment of a technical subject. Upon recent visits to a number of industrial plants that use fuel oil he found his earlier book, "Fuel Oil in Industry," on nearly all the shelves. The purchasing agents admitted that it was a nicely prepared book, but added that they did not know what it was all about. In reply the author published this little volume, especially designed for the needs of purchasing agents, but it will prove enjoyable

reading for anyone who has any interest in the industrial uses of petroleum.

The book begins with an informal discussion of what oil is and in clever treatment of a chemical subject, Mr. Andros runs first class competition with H. C. Witmer, Donald Ogden Stuart, and others of their school. Having answered his first question, the author asks why oil is. Again his treatment is original and enjoyable.

Further chapters deal with the methods of refinement, the properties of oil, the most desirable gravity to buy, preheating and storage, the methods of burning, and government specifications and tests. All of these chapters contain valuable information for the purchasing agent who lacks an engineering education, and he is not forced to spend evenings in the clutches of encyclopedic textbooks to get it.

An appendix to the book provides a number of simple hints about the unloading of tank cars, and a few desirable tables of use to the consumer.

In passing judgment upon any book it is necessary to answer one important question: Has the author been successful in his purpose? Mr. Andros has. His purpose is manifest in the title. And when the reader has laid the book down he feels adequately equipped to cope with the purchasing, distribution, storage and burning problems of any number of millions of gallons of oil fuel. And incidentally he has spent a very pleasant two hours and possesses some valuable reference material.

T. H. G.

New Books Received

Profits. By William Trufant Foster and Waddill Catchings. Pages 465, 5½ x 8¼ in., illustrated. Published by Houghton Mifflin Co. for the Pollak Foundation for Economic Research, Newton 58, Mass. Price, \$4.

Population Problems in the United States and Canada. Edited by Louis I. Dublin. Pages 318, 5½ x 8¼ in., illustrated. Published by Houghton Mifflin Co. for the Pollak Foundation for Economic Research, Newton 58, Mass. Price, \$4.

Engineering Index. 1925. Pages 792, 6½ x 9½ in. Published by the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York. Price, \$7.

Aircraft Instruments. By H. N. Eaton, K. Hilding Beij, William G. Brombacher, W. Willard Frymoyer, H. B. Hendrickson, C. L. Seward, and D. H. Strother. Pages 269, 6 x 8¼ in., illustrated. Published by the Ronald Press Co., 15 East Twenty-sixth Street, New York. Price, \$5.

Balloon and Airship Gases. By Charles deForest Chandler and Walter S. Diehl. Pages 226, 6 x 8¼ in., illustrated. Published by the Ronald Press Co., 15 East Twenty-sixth Street, New York. Price, \$4.

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Corrosion. Causes and Prevention. By Frank N. Speller. Pages 621, 6¼ x 9¼ in., illustrated. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$6.

The Agricultural Problem in the United States. Pages 157, 6¼ x 9¼ in., illustrated. Issued by the National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$2.

Employee Representation. By Ernest Richmond Burton. Pages 283, 5½ x 8½ in., illustrated. Published by Williams & Wilkins Co., Mt. Royal and Guilford Avenues, Baltimore. Price, \$3.

Handbook of Safety and Accident Prevention. By Fred G. Lange. Pages 512, 6¼ x 9¼ in., illustrated. Published by the Engineering Magazine Co., 116 West Thirty-second Street, New York. Price, \$5.

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THE IRON AGE

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Interdependence of Competitors

SHORT term buying has been demonstrating to the steel industry that high production is possible without large backlogs. At no time during the past 12 months has there been heavy forward buying; yet steel ingot output during the year ended May 31 was the largest for any 12-month period. Cautious buying has become an accepted condition in the market and has begotten circumspect production. It has long been recognized that there is a surplus of steel capacity in this country, and there is a growing appreciation of the folly of a sales policy that would lead to overproduction. There has been much talk of the need of adjusting output to the volume of consumption, and from present indications this policy is becoming more and more general.

Competition for business is still keen, but it is not the ill-considered competition of other times, which disregarded costs in the effort to stimulate business. It is realized that, if the amount of business available is limited, it cannot be increased by price reductions without encouraging speculative buying with its well known dangers to economic stability. It requires no collusion between intelligent competitors to demonstrate that each has a right to existence and that no one of them can expect to obtain a disproportionately large share of the going business without bringing on a reaction from which all would suffer alike.

In 1924 and 1925 the absence of good backlogs for the mills led sellers to underestimate the extent of demand and therefore to be keener in the pursuit of tonnage. It took a long time for order departments to view with equanimity the opening of a new month without assurance that the rate of mill operations at the beginning could be fairly well maintained. But today the adjustment to the market's habit of lock-step buying has even gone so far that there is no real panic when a week opens without orders and specifications in hand that will permit the making up of a six-day schedule for a particular department.

Prophecy is hazardous in respect to steel, and it would be unwise to predict that the market will not

again see an old-fashioned buying movement, with advancing prices and lengthening delivery periods. But such a result of the springing up of a demand in excess of the country's capacity, it is fair to say, will not come this year or next. Meanwhile the better recognition of the interdependence of competing producers which has been in evidence this year is a factor to be reckoned with, since it gives promise of greater market stability.

Record Year in Finished Steel

FULL statistics of steel production in 1925 are given elsewhere in this issue of THE IRON AGE. As the ingot production was known approximately at the beginning of the year, and the precise total early in May, by the revised monthly figures, no special reference need be made to the total, 44,140,738 tons, which exceeded the previous post-war record of 43,485,665 tons in 1923 and the previous record of all time, 43,619,200 tons in 1917. By far the two best pre-war years were 1912 and 1913, with approximately 30,280,000 tons in each year, and 1925 exceeds those years by 46 per cent.

In steel castings the showing was not so good. The total of 1,252,786 tons last year was exceeded in the last three of the war years, 1916, 1917 and 1918, and in 1923, while it showed only 25 per cent increase over the years 1912 and 1913, against the 46 per cent gain in ingots.

Ingots, however, are only a means to an end. What is called "finished rolled steel" is of more commercial significance. The production of finished rolled steel in 1925 was 32,659,685 tons, making a new record. The percentage of finished rolled steel to ingots has been as follows, war time figures not counting, as there was then much production of shell steel, with unusual cropping:

Rolled Steel to Ingots, Per Cent

1919.....	71.4	1923.....	74.3
1920.....	75.8	1924.....	74.4
1921.....	74.2	1925.....	74.0
1922.....	73.9		

It is curious that the figures for the different years hang so closely together. One may disregard 1919 and 1920 through their being somewhat out

of date, and also because of the strike in 1919. The five subsequent years average 74.16 per cent.

As 1924 was an off year, comparisons are made with 1923. Rails, with 2,785,257 tons in 1925, fell far short of their record output, made in 1906, and also fell short of 1923 by 4 per cent. Rods, with 2,844,656 tons, fell short of 1923 by 7½ per cent. The high output of 3,518,746 tons of rods in 1916 was due to two defensive activities in the war—submarine nets and barbed wire entanglements. Plates lost 10 per cent last year. Welded tubular goods, including merchant pipe, oil country goods, etc., with 3,030,541 tons, fell short of 1923 by 9.6 per cent.

Structural shapes made a new record at 3,604,130 tons, exceeding the previous high by 200,000 tons. Concrete bars went 20 per cent beyond the previous peak, reaching 819,587 tons. Tin plate at 1,729,287 net tons was 113,000 tons above the previous high of 1917. Terne plate went almost 20 per cent beyond the previous record, reaching 127,443 net tons. Galvanized sheets at 1,269,556 net tons went 87,000 tons ahead of 1923. Cast iron pipe and fittings, 2,324,047 net tons, exceeded the 1924 record by 26 per cent.

Both structural steel and cast iron pipe records may be attributed to the great building boom. Skelp, which would fit also into that boom, was second only to the big record of 1923. Even considering growth in population and in individual consumption of steel products, the year 1925 made a notable mark in the history of the steel industry.

The Case of the Corn Planters

IT is clear that the predominating issues in American affairs, economically, socially and politically, at the present time are the agrarian question and the prohibition of alcoholic drink; and that the next elections will hinge around them. It is unnecessary to discuss their relative importance. Both of them are troublesome. The agrarian question is, however, the more exigent.

We are perhaps magnifying the complaint of the corn planters, focusing in Iowa, by characterizing it as the agrarian question. However, the economic difficulty that obtains there is more or less common to all farmers, but is there aggravated. This aggravation is clearly ascribable to the farmers' own folly in the past; but except in the interest of scientific analysis it is useless to dwell on that. The corn planters feel sore and poor, and demand that something be done to help them, and that it be done quickly.

In this they have the support of the labor unions. Matthew Woll, one of the vice-presidents of the American Federation of Labor, recently declared:

Labor unqualifiedly concurs in the judgment that the farmers are deserving of support, even though it should mean an appreciable rise in the price level. Labor believes that a constructive plan of agricultural relief is imperative. It will add far less to the cost of living ultimately than will be added if the farmers are forced to continue to live on the fringe of bankruptcy.

The naked meaning of the corn planters' demand, with the concurrence of the labor unions, is a bonus to be paid by that small class of people who contribute the bulk of the income tax, which in political clap-trap is characterized as "big busi-

ness." It is a demand for the counteraction of economic forces by means of a national dole, just as the British coal miners are similarly claiming support.

The economic upheaval that was a consequence of the war resulted in trouble for several of our great industries, especially agriculture, the manufacture of textiles and boots and shoes, and the mining of bituminous coal. In each instance the root trouble was over-development and the attachment of too large a personnel to each industry. By virtue of labor union impediments the miners and manufacturers have obtained support on the basis of part-time work, but the agriculturists, unaided by any such interference, have felt the full force of economic pressure. Workers are migrating from the farms to the towns, and it is the fear of their competition in town labor that so exercises the American Federation of Labor.

This natural movement is no more to be checked than can the incoming tide of the sea be stayed. Eventually the influx of labor into the towns will reduce the cost of manufacturing labor, and its efflux from the farms will raise the costs of foods and fibers, which lowering and raising will be tempered only in so far as the managerial brains of the country improve methods. This is a slow and painful process. Everybody feels deep sympathy with the farmers, but intelligence knows that there is nothing artificial that can be done for them that would not worsen the general situation. The only sound thing that can be done for the farmers is to teach them better management, which unfortunately they are averse to learning.

The great mischief of the present agitation is that it upsets the balance of political power, threatens to deprive the administration of Congressional backing, and augurs the enactment of unwise legislations as compromises, which will be futile, and sooner or later will fly back to plague us.

Sheet Prices and Demand

IN the past few months the sheet market has been conspicuous among finished steel products for its price declines. There is no occasion for invidious comparisons, however, for after all these losses have been merely of gains made late in 1925. The sheet market as a whole has scarcely reverted to its lowest level of last year. Black sheets and automobile sheets are practically back, but galvanized sheets have scarcely gone so far, and there is no very substantial difference in the cost of zinc.

Other finished steel products have not had similar declines lately, but they had not had similar advances. Thus the difference is not so much that the sheet market has declined, as that it had an advance six or seven months ago which the other markets did not enjoy.

There is so much talk of the sheet trade having a large capacity that it is of interest to make comparisons. At the end of 1914 (THE IRON AGE, Jan. 7, 1915, page 10) there were approximately 468 sheet and jobbing mills in the United States—one-third American Sheet & Tin Plate Co. and two-thirds "independent." The latest report of the National Association of Sheet and Tin Plate Manufacturers gives the present total at 710, and of

these slightly less than one-fourth belong to the Steel Corporation.

The increase in the number of sheet and jobbing mills from what may be called the pre-war condition is 52 per cent. In the same period there has been an increase of approximately 60 per cent in the steel ingot capacity of the country.

Yet there is no doubt that the demand for sheets has increased considerably more than has the demand for steel in general. A recondite point is that there has been an increase in capacity per sheet mill. This is well recognized, although there is no statistical measure for it.

Even a large increase in capacity per mill should be covered more or less by the increased demand. Production of sheets last year, exclusive of tin mill black plate, was 4,086,832 gross tons, which is 2.88 times the production in 1914. Of course, 1914 was an off year, but there has been only a 52 per cent increase in the number of sheet mills.

Much of the increase from 1914 to 1925 was due to fuller operation last year. In two months of last year, October and November, independents reported production about 7 per cent above their rated capacity, on a rating basis adopted only some three years ago. Apparently capacity per mill increased greatly even in that time.

Comparing prices in 1914 with recent prices, there was in 1914 a low level of 1.80 cents for black sheets, and an average for the year of 1.89 cents. Last year's low level, struck more than once, was 3.10 cents, and the present market is about the same. There is an increase of 72 per cent, and that is only a trifle less than the advance in other finished steel products from their low points of 1914.

Make Employee Benefits Real

ASSOCIATED Industries of Massachusetts publishes in the current number of *Industry*, its official organ, the results of a study by Edward M. Coffin, its industrial engineer, of 76 mutual benefit associations. The article demonstrates how far short of being standardized is this phase of industrial welfare work. Evidently many of the organizations included in the survey were established in a hit-or-miss manner, following no sound actuarial practice and no well-tried model.

The weekly benefits range from \$5 to \$15, and the number of weeks in a year in which a member receives benefits from 4 to 26. Like variance is noted in the amount of death benefits, initiation fees and dues, eligibility to membership based on length of service and physical condition, the waiting period before benefits begin following incapacity for work, and methods of distributing surplus and meeting deficits. In some of the associations there seems to be a lack of guarantee that benefits will be paid. When funds in the treasury become depleted the means of replenishing them are entertainments, assessments, reductions in benefits and calling upon the company for financial assistance. In all such cases business-like methods seem to be lacking.

It appears that 25 per cent of the companies contributed an amount equal to that collected by the employees, while two companies contributed 10 per

cent and two others 20 per cent of the employees' premiums. In 40 per cent of the cases the owners contributed nothing. Not considered in the data, the report states, are companies which bear the full cost of illness without employee contribution.

In the same number of *Industry* appears a synopsis of an employee disability and death benefit plan which seems to be established on a sound basis. It might serve as a foundation of study by any company planning the organization of a mutual benefit association. The cost to the worker is small. The average man or woman pays 25 cents a week for substantial protection for himself and his family. The company guarantees the fund and meets administration expenses.

Briefly, employees are divided into three groups, according to their annual earnings. Those who earn less than \$1,500 pay \$1 a month, receive \$10 a week benefit in case of disability from any cause, have a death benefit of \$500, and if permanently disabled receive 80 per cent of the amount of the death benefit in monthly installments of \$15. The next class, composed of those receiving between \$1,500 and \$2,500 a year, pay \$1.50 a month, have a weekly disability benefit of \$11, a death benefit of \$1,000, and in case of permanent disability \$25 a month. The third class, those whose earnings are more than \$2,500 a year, pay \$2 a month, have a weekly benefit of \$12, a death benefit of \$1,500, and \$33.33 a month in case of permanent disability, to the amount of 80 per cent of the death benefit. The length of time the weekly benefit runs depends upon length of service, the minimum being 13 weeks for those whose employment has been less than two years, up to 208 weeks for those with a service record of 20 years or over. In creating the system this year, every employee on the payroll on April 30 was eligible to membership without physical examination. Newcomers must measure up to a physical standard to be determined by the company's relief department. While the above provisions are not credited in the article to the Bethlehem Steel Corporation, they tally with the plan which that company recently announced and in which 90 per cent of the 70,000 Bethlehem employees have asked for participation.

Vastly different in its effect on shop morale is an association based on a plan like this, and one in which there is always the chance of an impoverished treasury jeopardizing the benefits for which employees have paid.

Rebuilding Alabama Blast Furnaces

BIRMINGHAM, ALA., June 22.—Work has been started on the building of a blast furnace to replace furnace No. 2 of the two city furnaces of the Sloss-Sheffield Steel & Iron Co. It is to be of 400 tons daily capacity against 265 as now. Existing blowing engines and other apparatus will be the only parts of the old plant to be used. It is estimated that it will take until early next year to complete the furnace. Then the work of rebuilding No. 1 will start. These new furnaces will place the Sloss-Sheffield Steel & Iron Co. in a still stronger position, being already one of the largest foundry iron producers in the country. Upward of \$750,000 will be expended on the two blast furnaces. The Sloss-Sheffield company has five furnaces now in operation, with No. 4 furnace at North Birmingham being relined and repaired. It is expected to resume operation about July 15.

GERMAN ORDER SUSPENDED

Treasury Department to Get Further Information on Export Bonuses

WASHINGTON, June 22.—Under date of June 18, Assistant Secretary of the Treasury L. C. Andrews issued an order to collectors of customs suspending until further notice the effective date of treasury decision 41,661, which imposed countervailing duties on certain iron and steel products imported into this country from Germany. The order had been made effective June 20, and it provided for the collection of additional duties on iron and steel imports from Germany equal to the amount of bonuses on German exports paid by the German Raw Steel Syndicate. The suspending order of Assistant Secretary Andrews is as follows:

TREASURY DEPARTMENT

June 18, 1926.

To Collectors of Customs and others concerned:

Reference is made to T.D. 41,661 relative to assessment of countervailing duty on such German iron and steel products as may be exported with benefit of a bounty paid by the Raw Steel Syndicate of Düsseldorf, Germany.

The department is now in receipt, through the Department of State, of a request from the German ambassador that the effective date of this decision be deferred until his Government has had an opportunity to show that the department's understanding of the agreement between the Raw Steel Syndicate and the iron consuming industries does not represent the situation which actually exists in the German iron and steel industries. The instructions contained in T.D. 41,661 are, therefore, suspended until further notice and in the meantime entries covering German iron and steel products should be liquidated in the usual manner.

(Signed) L. C. ANDREWS,

Assistant Secretary

To Build Railroad for New Texas Oil Field

The board of directors of the Chicago, Rock Island & Pacific Railway has authorized the incorporation and construction of the Amarillo & Liberal Railroad. This line will traverse extensive oil and gas fields north of Amarillo, Tex. Bids for construction have been called for and actual construction will start at an early date. Directors of the new company are: J. E. Gorman; Lee Bivens, Amarillo; Robert Harrison, Fort Worth; C. T. Herring, Amarillo; N. H. Lassiter, Fort Worth; L. P. Parkinson, Fort Worth, and A. B. Warner, El Reno, Okla.

New England Association Elects Officers

The annual meeting of the New England Iron and Hardware Association was held Tuesday evening, June 15, at Young's Hotel, Boston, and was well attended. Roswell M. Boutwell, Standard Horse Shoe Co., Boston, who was elected president to fill the unexpired term of the late Charles A. Haines, presided at the meeting. The following officers were elected for the ensuing year: William A. Hopkins, Decatur-Hopkins Co., Boston, president; Franklin E. Bragg, N. H. Bragg & Sons, Bangor, Me., vice-president. George J. Mulhall was reelected secretary and treasurer of the association.

In addition to the newly elected president and vice-president, the board of directors includes: Charles A. Adams, John B. Varick Co., Manchester, N. H.; Charles W. Henderson, Jr., A. C. Harvey Co.; Roswell M. Boutwell; Frank F. Chase, Chase, Parker & Co.; F. Marsena Butts, Butts & Ordway Co.; R. H. Sanderson, E. P. Sanderson Co.; W. H. Bowe, Herrick Co.; Q. W. Wales, Brown-Wales Co., all of Boston; George M.

Gray, Peter Gray & Sons, Cambridge, Mass.; C. D. Alexander, Emery, Waterhouse Co., Portland, Me.; M. B. Damon, Fitchburg Hardware Co., Fitchburg, Mass.; and C. C. Dodge, George F. Blake, Jr., & Co., Worcester, Mass.

Freight Rates Declared Unreasonable

WASHINGTON, June 22.—Joint rates charged the H. D. Taylor Co., Inc., et al., with headquarters at Buffalo, on iron and steel products from Cleveland, Youngstown, Girard and Warren, Ohio, to Black Rock and Buffalo, N. Y., were declared by the Interstate Commerce Commission unreasonable to the extent they exceeded the aggregate of intermediate rates over the routes of movement. The charge was the fifth-class rate of 25c., while a combination rate of 23c. was in effect. Reparation was awarded. The products included sheets, angles, bars, washers, hoop and band steel, plates and wrought pipe.

To Discuss Rail Rates on Gulf Imports

WASHINGTON, June 22.—The Interstate Commerce Commission has set July 12 as the date for a hearing to be held at Kansas City regarding import rates on iron and steel products through Gulf ports to destinations in Texas and Oklahoma. The proceeding will be held before Examiner Copenhafer.

Plan to Eliminate Styles in Heating Radiators

WASHINGTON, June 22.—Plans for a reduction in the variety of radiators were made at conference here last Thursday under the auspices of the Division of Simplified Practice. Approximately 90 per cent of the radiator output was represented. A motion was adopted requesting the National Boiler and Radiator Manufacturers' Association to conduct a survey of the existing variety. Discussions indicated that the existing variety was affected by the demands of architects and consulting engineers, and was complicated by the height of windows, type of building construction, etc. Representatives of some of the companies reported that there are items which contribute as little as 0.3 per cent of their total demand, while as much as 75 per cent of their business comes from five or less sizes.

Ohio Foundries Show Decline for May

The melt of foundries belonging to the Ohio State Foundrymen's Association was 76.2 per cent of "normal" for May, which is a considerable decline from 86 per cent reported for April. The melt in May, 1925, was 77.8 per cent of normal. The normal melt for the foundries reporting was put at 22,976 tons, against which there was actually melted in May, 1926, 17,518 tons.

Stocks received in May decreased to 68.9 per cent, as compared with 72 per cent in April, and 59 per cent in May, 1925. Stocks received is a total of all grades of pig iron and non-ferrous material, and all grades of scrap, ferrous as well as non-ferrous. The total for May, 1926, was 15,852 tons, or 68.9 per cent of the normal melt.

Stocks on hand have decreased to 95 per cent in May, as against 100 per cent in April and 108 per cent in May a year ago. Non-ferrous operations decreased to 57.2 per cent in May from 68 per cent in April. Operations in May, 1925, stood at 61 per cent.

Domestic sales of oak leather belting for May are reported by the Leather Belting Exchange, which represents about 60 per cent of the total production, at 337,042 lb. valued at \$566,568 or \$1.68 per lb. This shows a substantial drop both from the figures for April (359,298 lb. valued at \$609,369 or \$1.70 per lb.) and from those of May, 1925 (345,926 lb. valued at \$602,258 or \$1.74 per lb.).

Iron and Steel Markets

Steel Orders at Increased Rate

June Betterment Continues—Pig Iron Buying Largest Since November, 1924—Steel Bars Most Active—Consumers Add to Stocks

STEEL orders are holding up to the better rate that began to be noticed in late May, and there is a more confident attitude toward the market on the part of both consumers and producers.

On the one hand buyers are carrying somewhat larger stocks of steel and are less on the qui vive for price changes. At the same time sellers are better maintaining their rate of operations and their prices than seemed likely 60 days ago.

New business entered in June on the books of the steel mills has been exceeding the rate for May. At the same time, production has shown a moderate decrease, the operating percentage for the month being estimated between 75 and 80. These conditions maintained to the end of the month will make a better showing than that of May, at least to the extent of a smaller reduction in unfilled orders.

Operations in July will show some let-down from the rate in June. Two steel works blast furnaces in the Pittsburgh district are about to go out. Rail mill rollings next month will show a falling off.

Bars, as the form of finished steel in largest use, have been a center of activity. At Chicago bar specifications in the past three weeks are put at more than 90 per cent of those of an equal period in May. Pittsburgh mills also have received heavy specifications against 1.90c. bar contracts.

In the sheet market the stabilizing effort of some mills is reported, and the low prices of the past fortnight have been less general.

An interesting development in connection with the effort of sheet mills to get lower-priced steel is the naming of \$36, Cleveland, for third-quarter sheet bars. So far as Cleveland is concerned this is a concession from the second-quarter price, which has been \$36, but with Pittsburgh and Youngstown basing.

Shipments of sheets for the first five months of the year have averaged close to 95 per cent of capacity, judged by the records of the independent producers. For the like period of 1925 the figure was 86. Production balanced shipments this year but last year outran them. On June 1 the industry had the same backlog of orders as on that date last year.

In respect to bars, plates and shapes, the Pennsylvania Railroad lettings of next week are expected to show to what extent recent advances will figure in future business. The Norfolk & Western, Seaboard Air Line and Chesapeake & Ohio are inquiring for their usual quarterly requirements, amounting to several thousand tons.

At Chicago track accessories are in fresh demand, inquiries including 8000 tons of tie plates and 5000 tons of angle bars.

Pipe line work is still an important factor.

A Youngstown mill has just taken a contract for 100 miles, or 12,000 tons, for the Upham Gas Co. lines in Texas.

Shipments of tin plate in the first half of the year are making another record, exceeding the 20,000,000 boxes of the first six months of 1925.

Bookings of fabricated structural steel for five months covered 1,024,800 tons compared with 1,000,400 tons and 1,006,330 for the same periods of 1925 and 1924, respectively.

Pig iron sales of the week make the present buying movement the largest since that of November, 1924. Cleveland has added 75,000 tons to its previous large total, and in the Cincinnati district 150,000 tons has been closed in two weeks, one steel company taking 100,000 tons for the second half. Low prices led consumers to contract farther ahead than in months. Eastern buying has increased also, Buffalo and Eastern blast furnaces competing sharply, after the recent manner of Lake Erie and southern Ohio producers.

Reports of foundry operations are not uniform. In some districts the rate holds up, but the Ohio foundries which furnish statistics ran at 76 per cent in May as against 86 per cent in April.

Steel melting scrap has been more active at Chicago, but there is little movement elsewhere, and consumers have shown less interest than dealers.

German iron and steel products continue to come in at regular duties. The Treasury Department has suspended its order, effective June 20, imposing countervailing duties, and meanwhile the German ambassador will argue for an indefinite suspension.

Rolled steel imports are growing. For April and May the average was 34,000 tons, against 21,000 tons in the first quarter of the year. All iron and steel imports in May were 108,731 tons, the largest since January, 1923, when pig iron was pouring in and only 9000 tons out of a total of 120,000 tons was rolled steel. Last month pig iron was 57,211 tons, and rolled steel 32,543 tons, of which bars were 12,386 tons.

Exports of iron and steel products from the United States in May were 173,418 tons; for the five months, 869,077 tons, or 23 per cent more than in 1925. Steel pipe formed the largest item in May.

An advance in steel beams places THE IRON AGE finished steel composite price at 2.431c. per lb., in place of 2.417c. last week.

Pig iron remains at \$19.79 for the third week, no change having occurred in any of the four components making up THE IRON AGE composite.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous
For Early Delivery

Pig Iron, Per Gross Ton:	June 22, 1926	June 15, 1926	May 25, 1926	June 23, 1925
No. 2X, Philadelphia...	\$22.76	\$22.76	\$22.76	\$21.26
No. 2, Valley Furnace...	18.00	18.00	18.50	18.50
No. 2, Southern, Cin'tit...	24.19	24.19	25.69	22.55
No. 2, Birmingham...	21.00	21.00	22.00	19.00
No. 2 foundry, Chicago*	21.00	21.00	21.50	20.50
Basic, del'd, eastern Pa.	21.25	21.25	21.75	21.50
Basic, Valley furnace...	18.00	18.00	18.00	18.00
Valley Bessemer del. P'gh.	20.76	20.76	20.76	20.76
Malleable, Chicago*	21.00	21.00	21.50	20.50
Malleable, Valley	18.00	18.00	18.50	18.50
Gray forge, Pittsburgh...	19.26	19.26	19.76	19.76
L. S. charcoal, Chicago...	29.04	29.04	29.04	29.04
Ferromanganese, furnace...	88.00	88.00	88.00	115.00

Rails, Billets, Etc., Per Gross Ton:

O.-h. rails, heavy, at mill...	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill...	34.00	34.00	34.00	39.20
Bess. billets, Pittsburgh...	35.00	35.00	35.00	35.00
O.-h. billets, Pittsburgh...	35.00	35.00	35.00	35.00
O.-h. sheet bars, P'gh...	36.00	36.00	36.00	35.00
Forging billets, base, P'gh.	40.00	40.00	40.00	40.00
O.-h. billets, Phila...	40.30	40.30	40.30	40.30
Wire rods, Pittsburgh...	45.00	45.00	45.00	45.00
Skelp, gr. steel, P'gh, lb..	1.90	1.90	1.90	1.90

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.22	2.22	2.22	2.22
Iron bars, Chicago...	2.00	2.00	2.00	2.00
Steel bars, Pittsburgh...	2.00	2.00	1.90	2.00
Steel bars, Chicago...	2.10	2.10	2.10	2.10
Steel bars, New York...	2.34	2.34	2.24	2.34
Tank plates, Pittsburgh...	1.90	1.90	1.85	1.90
Tank plates, Chicago...	2.10	2.10	2.10	2.14
Tank plates, New York...	2.24	2.24	2.24	2.14
Beams, Pittsburgh...	2.00	1.90	1.90	2.00
Beams, Chicago...	2.10	2.10	2.10	2.20
Beams, New York...	2.24	2.24	2.24	2.34
Steel hoops, Pittsburgh...	2.50	2.50	2.50	2.40

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	June 22, 1926	June 15, 1926	May 25, 1926	June 23, 1925
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.10	3.10	3.15	3.10
Sheets, black No. 28, Chicago dist. mill...	3.25	3.25	3.35	3.20
Sheets, galv., No. 28, P'gh.	4.25	4.30	4.40	4.15
Sheets, galv. No. 28, Chicago dist. mill...	4.50	4.50	4.60	4.25
Sheets, blue, 9 & 10, P'gh.	2.30	2.30	2.40	2.30
Sheets, blue, 9 & 10, Chicago dist. mill...	2.40	2.40	2.60	2.35
Wire nails, Pittsburgh...	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill...	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh...	2.50	2.50	2.50	2.45
Plain wire, Chicago dist. mill...	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh.	3.35	3.35	3.35	3.40
Barbed wire, galv., Chicago dist. mill...	3.40	3.40	3.40	3.55
Tin plate, 100 lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$15.50	\$15.00	\$15.00	\$17.25
Carwheels, Philadelphia...	17.00	17.00	17.00	17.00
Heavy steel scrap, P'gh...	16.00	16.00	15.50	17.50
Heavy steel scrap, Phila...	15.00	15.00	15.00	15.50
Heavy steel scrap, Ch'go...	12.50	12.25	12.00	15.50
No. 1 cast, Pittsburgh...	16.00	16.00	16.50	17.00
No. 1 cast, Philadelphia...	17.00	17.00	17.00	17.50
No. 1 cast, Ch'go (net ton)	16.50	16.00	15.75	17.50
No. 1 RR. wrot. Phila...	16.50	16.50	17.00	18.50
No. 1 RR. wrot. Ch'go (net)	12.00	11.50	10.50	14.50

Coke, Connellsville,

Per Net Ton at Oven:

Furnace coke, prompt...	\$2.75	\$2.75	\$2.85	\$2.75
Foundry coke, prompt...	4.00	4.00	4.00	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.00	14.12½	14.00	13.75
Electrolytic copper, refinery	13.70	13.75	13.57½	13.50
Zinc, St. Louis...	7.12½	7.25	6.85	7.00
Zinc, New York...	7.47½	7.60	7.20	7.35
Lead, St. Louis...	8.10	8.00	7.40	7.90
Lead, New York...	8.35	8.25	7.65	8.25
Tin (Straits), New York...	61.37½	61.00	61.00	56.50
Antimony (Asiatic), N. Y.	13.00	10.50	9.50	16.50

Pittsburgh

Marked Improvement in Steel Buying, Notably in Sheets

PITTSBURGH, June 22.—The steel market in this district has gathered strength during the past week. Producers are encouraged by both new business and specifications and have taken a firmer attitude regarding prices. Significant of the upturn and the position of manufacturers is the development in the market for plates, shapes and steel bars. The prices of 1.90c. on plates and 2c. on steel bars have become firmer while the recent advance to 2c. in shapes is being quoted by more producers. Some steel companies have advised sales managers that unless contracts for the three products are specified against before they expire on June 30, no extension will be granted. These contracts were made at the previous lower levels. This attitude of the mills has stimulated orders and brought in new business, which in the aggregate reaches an attractive tonnage. Rolling schedules for this season are accordingly good.

It is estimated that production in this district ranges from 75 to 80 per cent of capacity. While there is no back-log of consequence being built up, it is recognized that bookings now mean actual specifications for the most part and comparatively quick consumption.

Evidence of improvement is reflected in a number of other lines, including sheets. There are increased specifications and orders coming from diversified sources. The automotive industry is buying more freely and so are jobbers and other interests, some of whom search the market with particular care, coming in only when they feel it has dipped to its lowest point. The stronger tone in the sheet market leads some makers of sheet bars to the belief that buyers of this latter product will be unsuccessful in efforts being made to get concessions under the present price of \$36.

Pipe and tin plate are strong. And there are lines which continue to remain quiet although reflecting some improvement. Among them are wire products, strip steel and semi-finished material.

The market for pig iron is slightly better with prices unchanged, but some furnace interests believe the firmer tone in steel will soon react on the raw material. While as yet no higher quotations are being asked for steel-making iron, two Valley interests have announced an advance of 50c. in foundry iron and are now quoting \$18.50, Valley, for the standard grade, although plainly the market has not attained this level.

Pig Iron.—Melters are cautious and are buying only in accordance with requirements, but the market shows a little more strength than it did one week ago. This is due in part to the slightly greater turnover that followed the recent flurry in purchases. When taken in the aggregate the movement in foundry iron represents a fair proportion. Steel-making grades show less

activity than foundry iron. Tonnages of all kinds are still easily available at the old prices, but two merchant furnace interests in the Valley are quoting No. 2 foundry at \$18.50, or 50c. above the current market. It is understood that no sales have been made at the advanced figure, but producers apparently believe that the market is gathering enough force to establish it at this level in the near future. At the same time, buying continues to be made in small lots to meet immediate requirements. It is also the position of melters that some furnaces having iron piled can readily make shipments from stocks and that as long as this condition prevails, sharp advances in price are improbable. There are seven merchant furnaces in operation and three idle in the Valleys, but whether or not this rate of production will continue depends upon the position of the market. A moderate amount of contracting for third quarter at existing levels is being done. Bessemer is perhaps the strongest grade of all at \$19, Valley, although the volume of sales of this grade is not so great as in the case of foundry. The market for basic iron is quiet at \$18, Valley. One sale of this latter grade called for 500 to 800 tons. An offer of \$17.50 has been made by one consumer of basic but was declined; it is said to have been submitted for the purpose of sounding out the market. Low phosphorus iron is quoted at \$27 to \$28.50, furnace.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic	\$18.00
Bessemer	19.00
Gray forge	17.50
No. 2 foundry.....	18.00
No. 3 foundry.....	17.50
Malleable	18.00
Low phosphorus, copper free.....	27.50

Ferroalloys.—No new transactions of consequence have taken place in ferromanganese. The market is quiet and unchanged at \$88, furnace. For the most part consumers are covered for the remainder of the year. Specifications against contracts are slightly greater. Demand for spiegeleisen is also quiet. Contracts for this alloy for third quarter and last half delivery have been made at quotations prevailing during the first half. Prices are given on page 1811.

Semi-Finished Steel.—Pressure still is being brought to bear by buyers of sheet bars to get material at less than the ruling prices of \$36, Pittsburgh or Youngstown, but producers claim that no concession is being made. In view of a firmer tone in sheets the market for bars is somewhat stronger, though a test will not be made until there is more active placing of third quarter business. The market in other semi-finished lines is dull, with standard billets and slabs carrying the nominal quotation of \$35, while the small billet quotation is \$36. Wire rods show a little more activity, with the price unchanged. The market for skelp is inactive. Prices are given on page 1811.

Wire Products.—Greater stability is noted in the market for wire products. There is evident an in-

creasing tendency toward better demand in most all lines, though some remain seasonally dull. Stocks in the hands of jobbers are small, with the result that while orders have been light in volume they are more frequent. Prices are given on page 1809.

Rails and Track Supplies.—This being the dull season for buying of standard rails, the market in this district is notably active. Spikes and tie plates are moving only in moderate volume. Demand for light rails is small, due in part to the depressed condition in the coal industry. Prices are given on page 1809.

Tubular Goods.—Greater pressure for delivery is coming to pipe mills, especially for lapweld sizes. The industry is moving at a fast gait and operations in butt-weld tonnage range from 85 to 90 per cent, while lapweld capacity is engaged at 90 to 95 per cent. Jobbers are specifying heavily for standard pipe and prices are well maintained. Indications are that demand will develop further. Oil country goods and line pipe are in exceptionally heavy demand and concessions in prices in these grades apparently have disappeared entirely. Sustained demand over the third quarter, if not for the remainder of the year, is expected. In oil goods a shortage is reported in the larger sizes, including 12½ in., 15½ in. and 20 in. The Youngstown Sheet & Tube Co. has taken a contract for 100 miles of 16 in. outside diameter, 42 lb. lapweld pipe, entailing approximately 12,000 tons, for a gas line for the Upham Gas Co. for shipment to Texas points. Discounts are given on page 1809.

Sheets.—Substantial orders for sheets were placed during the past week and producers report there is a decided improvement in the market and that prices have become firmer. New business and specifications against contracts during the last two or three weeks have shown an improvement which, if sustained, soon will place the mills in a more comfortable position for the third quarter. There has developed a tendency on the part of buyers to make provision for requirements. Business is diversified and comes from both the jobbing trade and direct consumers. The improvement in the automobile industry, which is greater than even some of the closest students of the situation expected, has been an element in developing a better tone. While the market has not as yet become firm, it is stronger. Concessions still obtain in black sheets, but are less frequent, and this grade is selling more freely at a range of 3.10c. to 3.15c. Galvanized sheets are quoted at 4.30c. to 4.40c., base, and blue annealed at 2.30c. to 2.40c.

Tin Plate.—Establishing an unprecedented movement, shipments of tin plate for the first six months of the current year have gone beyond the previous record of 20,000,000 base boxes, which was set in the first half of 1925. Mills are operating at 80 to 85 per cent of capacity generally, with some fully engaged and filled up through July. The more favorable

THE IRON AGE Composite Prices

Finished Steel June 22, 1926, 2.431c. Per Lb.

One week ago.....	2.417c.
One month ago.....	2.403c.
One year ago.....	2.424c.
10-year pre-war average.....	1.689c.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 88 per cent of the United States output of finished steel.

	High		Low	
1926	2.453c.	Jan. 5;	2.403c.	May 18
1925	2.560c.	Jan. 6;	2.396c.	Aug. 18
1924	2.789c.	Jan. 15;	2.460c.	Oct. 14
1923	2.824c.	April 24;	2.446c.	Jan. 2

Pig Iron June 22, 1926, \$19.79 Per Gross Ton

One week ago.....	\$19.79
One month ago.....	20.04
One year ago.....	19.13
10-year pre-war average.....	15.72

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.

	High		Low	
1926	\$21.54,	Jan. 5;	\$19.79,	June 8
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	March 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

Base Per Lb.

F.o.b. Pittsburgh mills.....	2.00c. to 2.10c.
F.o.b. Chicago	2.10c. to 2.20c.
Del'd Philadelphia	2.32c.
Del'd New York	2.34c.
Del'd Cleveland	2.19c.
F.o.b. Birmingham	2.15c. to 2.25c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills.....	2.00c. to 2.10c.
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Rail Steel

F.o.b. mill	1.80c. to 1.90c.
F.o.b. Chicago	2.00c.

Iron

Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	3.00c.
Common iron, del'd Philadelphia.....	2.22c.
Common iron, del'd New York.....	2.24c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago	2.10c. to 2.20c.
F.o.b. Birmingham	2.00c. to 2.10c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	2.22c.
Del'd New York	2.24c.
C.i.f. Pacific ports.....	2.25c. to 2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mill.....	2.00c.
F.o.b. Chicago	2.10c. to 2.20c.
F.o.b. Birmingham	2.05c. to 2.15c.
Del'd Cleveland	2.09c. to 2.19c.
Del'd Philadelphia	2.22c. to 2.32c.
Del'd New York	2.24c. to 2.34c.
C.i.f. Pacific ports.....	2.30c. to 2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

All gages, narrower than 6 in., P'gh.....	2.50c.
All gages, 6 in. and wider, P'gh.....	2.30c.
All gages, 6 in. and narrower, Chicago.....	2.60c.
All gages, wider than 6 in., Chicago.....	2.50c.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills.....	2.50c.
Bars, f.o.b. Chicago	2.50c.
Bars, Cleveland	2.55c.
Shafting, ground, f.o.b. mill.....	*2.70c. to 3.00c.
Strips, f.o.b. Pittsburgh mills.....	3.75c.
Strips, f.o.b. Cleveland mills.....	3.60c. to 3.75c.
Strips, delivered Chicago	4.05c.
Strips, f.o.b. Worcester mills.....	4.05c.

*According to size.

Wire Products

(To jobbers in car lots f.o.b. Pittsburgh and Cleveland)

Base Per Keg

Wire nails	\$2.65
Galv'd nails, 1-in. and longer.....	4.65
Galv'd nails, shorter than 1 in.....	4.90
Galvanized staples	3.35
Polished staples	3.10
Cement coated nails	2.65

Base Per 100 Lb.

Bright plain wire, No. 9 gage.....	\$2.50
Annealed fence wire	2.65
Spring wire	3.50
Galv'd wire, No. 9.....	3.10
Barbed wire, galv'd	3.35
Barbed wire, painted	3.10

Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh	\$65.00
F.o.b. Cleveland	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth	68.00
F.o.b. Birmingham	68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. Pittsburgh.....	2.30c. to 2.40c.
Nos. 9 and 10, f.o.b. Ch'go dist. mills.....	2.40c. to 2.50c.
Nos. 9 and 10, del'd Philadelphia.....	2.62c. to 2.72c.

Box Annealed, One Pass Cold Rolled

No. 28, f.o.b. Pittsburgh.....	3.00c. to 3.15c.
No. 28, f.o.b. Ch'go dist. mill.....	3.25c. to 3.35c.
No. 28, del'd Philadelphia.....	3.32c. to 3.47c.

Galvanized

No. 28, f.o.b. Pittsburgh.....	4.25c. to 4.40c.
No. 28, f.o.b. Chicago dist. mills.....	4.50c. to 4.60c.
No. 28, del'd Philadelphia.....	4.62c. to 4.72c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.15c.
No. 28, f.o.b. Chicago dist. mill.....	3.35c.

Automobile Body Sheets

No. 22, f.o.b. Pittsburgh.....	4.20c.
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Long Ternes

No. 28, 8-lb. coating, f.o.b. mill.....	4.75c. to 4.85c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.....	5.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per package, 20 x 28 in.)

8-lb. coating, 100 lb. base.....	\$11.40
20-lb. coating I.C.....	\$16.20
25-lb. coating I.C.....	17.90
8-lb. coating I.C. 11.70	30-lb. coating I.C. 19.45
15-lb. coating I.C. 14.85	40-lb. coating I.C. 21.65

Alloy Steel Bars

(F.o.b. Pittsburgh or Chicago)

S. A. E. Series Numbers	Base Per 100 Lb.
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21.00* (1/2% Nickel, 0.10% to 0.20% Carbon)	\$3.20 to \$3.25
23.00 (3 1/4% Nickel)	4.40 to 4.50
2500 (5% Nickel)	5.50 to 5.65
3100 (Nickel Chromium)	3.40 to 3.50
3200 (Nickel Chromium)	5.00 to 5.25
3300 (Nickel Chromium)	7.00 to 7.25
3400 (Nickel Chromium)	6.25 to 6.50
5100 (Chromium Steel)	3.40 to 3.50
5200* (Chromium Steel)	7.00 to 7.50
6100 (Chrom. Vanadium bars).....	4.30
6100 (Chrom. Vanad. spring steel).....	3.80
9250 (Silicon Manganese spring steel).....	3.20 to 3.25
Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.).....	4.10 to 4.20
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)	4.30
Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)..	4.25 to 4.35
Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)..	3.40 to 3.50
Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum).....	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2 1/2-in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specifications, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill	\$36.00 to 38.00

Track Equipment

(F.o.b. Mill)

Base Per 100 Lb.

Spikes, 1/2 in. and larger.....	\$2.80 to \$3.00
Spikes, 1/2 in. and smaller.....	2.90 to 3.25
Spikes, bent and barge	3.25
Track bolts, all sizes.....	4.00 to 4.50
Tie plates, steel	2.35
Angle bars	2.75

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
1/2	46	19 1/2	1 1/2 to 2	+11	+39
3/4 to 1	51	25 1/2	2 1/2	22	2
1	56	42 1/2	3	28	11
1 1/4	60	48 1/2	1 to 1 1/2	30	12
1 to 3	62	50 1/2			

Lap Weld

2	55	43 1/2	2	23	7
2 1/2 to 6	59	47 1/2	2 1/2	26	11
7 and 8	56	43 1/2	3 to 6	28	13
9 and 10	64	41 1/2	7 to 12	26	11
11 and 12	53	40 1/2			

Butt Weld, extra strong, plain ends

1/2	41	24 1/2	1 1/2 to 2	+19	+54
3/4 to 1	47	30 1/2	2 1/2	21	7
1	53	42 1/2	3	28	12
1 1/4	58	47 1/2	1 to 1 1/2	30	14
1 to 1 1/2	60	49 1/2			
2 to 3	61	50 1/2			

Lap Weld, extra strong, plain ends

2	53	42 1/2	2	23	9
2 1/2 to 4	57	46 1/2	2 1/2 to 4	29	15
4 1/2 to 6	56	45 1/2	4 1/2 to 6	23	14
7 to 8	52	39 1/2	7 to 8	21	7
9 and 10	45	32 1/2	9 to 12	16	2
11 and 12	44	31 1/2			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2 1/4 in.....	27
2 1/2 to 2 3/4 in.....	37
3 in.....	40
3 1/2 to 3 3/4 in.....	42 1/2
4 to 13 in.....	46
1 1/2 in.....	+18
1 3/4 to 1 1/2 in.....	+8
2 to 2 1/4 in.....	2
2 1/2 to 3 in.....	7
3 1/2 to 4 1/2 in.....	9

Beyond the above discounts, 5 to 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.....	60
1 1/4 to 1 1/2 in.....	52
1 1/2 in.....	36
2 to 2 1/4 in.....	31
2 1/2 to 2 3/4 in.....	30
3 in.....	45
3 1/4 to 3 1/2 in.....	47
4 in.....	50
4 1/2, 5 and 6 in.....	45

Hot Rolled

2 and 2 1/4 in.....	34
2 1/2 and 2 3/4 in.....	42
3 in.....	48
3 1/4 and 3 1/2 in.....	50
4 in.....	53
4 1/2, 5 and 6 in.....	48

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base.....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.	

crop conditions, indicated by better weather, has added further strength to the market. Among large producers reporting record shipments during the first half of the year is the American Sheet & Tin Plate Co. Not only is demand good for food containers, but also for those in general lines, including paint, oil, drugs, candy, tobacco, etc. Prices are firm at \$5.50 per base box, Pittsburgh, for third quarter and last half business.

Cold Finished Steel Bars and Shafting.—Makers of cold finished steel have been encouraged over the improved buying that has come from the automobile industry, together with better orders and specifications for screw machine stock. Production still is rather low, however, but is more sustained. The quotation remains at 2.50c. per lb.

Cold Rolled Strips.—The market for cold rolled strip steel is irregular, and while concessions in price continue to be reported the quotation of 3.75c., base Pittsburgh or Cleveland, is being maintained generally, according to leading producers. Where lower quotations are made they are attributed to the need for setting up heavier schedules. The automobile industry and other consumers are coming into the market more freely, however, with the result that the market is becoming more stable. One important producer reports that orders in June were greater by 15 per cent than they were in May.

Hot Rolled Flats.—Demand for hot rolled strip steel is somewhat better, due to increased orders in the automobile industry and other consumers. One producer reports that June business exceeded that of May by 10 per cent. A maker of both cold rolled and hot rolled material is so confident of increased business and better prices that rather elaborate repairs are being made to meet the expected demand. Prices of hot rolled flats range from 2.30c. to 2.50c., although concessions in this grade also are claimed.

Steel and Iron Bars.—New business and specifications are coming in increased volume to mills for steel bars. The market is firmer at 2c. for general business, while some makers are quoting 2.10c., Pittsburgh, on lots of 100 tons and less and report orders on this basis. Lower quotations apparently have disappeared, although specifications at the old levels are being met. Mills plainly have assumed a stronger position and some of the prominent producers have instructed district managers to advise consumers who have contracts expiring June 30 that they will be canceled unless specifications are submitted by that time. This policy, together with the recent announcement of higher prices, has given greater stimulation in the way of specifying and has also increased the new business taken at the higher quotations. The market for iron bars remains unchanged.

Structural Steel.—The market for shapes now is quoted at 2c., base Pittsburgh, and a fair volume of business at the advanced quotation is being taken. On smaller tonnages, 100 tons and less, at least one large maker is quoting 2.10c. Specifications against contracts at 1.90c. have been stimulated since the announced increase in prices. As in the case of shapes, as well as plates, makers have given notice to buyers whose con-

tracts expire June 30 that they must specify by that date, or their requirements will be taken at the higher levels.

Plates.—While the market for plates shows only moderate activity, the price situation is firmer at 1.90c., base Pittsburgh. At least one producer is quoting 2c. on lots of 100 tons and less. The quotation is being made by some mills for commitments that do not go beyond August. This is taken to indicate confidence that the market will gain further strength.

Warehouse Business.—Warehouse prices remain unchanged. Demand is only moderate.

Bolts, Nuts and Rivets.—Prices are reported to be holding well. Orders are coming to producers rather slowly but indications are that June business will exceed that of May. Third-quarter contracts still are being closed and in view of the fact that consumers have little or no stock on hand, specifications are expected to follow closely. Operations among different producers are irregular, with some running as high as 75 per cent. Prices are given on page 1811.

Coke and Coal.—The market continues to drag. Decreased consumption has affected the price situation, so that there is a fluctuation ranging from \$2.75 to \$3 per net ton, Connellsville ovens, for spot 48-hr. fuel. The working off of surpluses has given encouragement to producers. The lower figure, however, is more prevalent than the \$3 price. Monthly and quarterly contracts generally are being closed at the higher quotation. No change has been made in the prices of standard 72-hr. coke, which range from \$4 to \$4.25 for spot delivery. Contracts for foundry coke are being made at \$4.25 to \$4.75. The market for coal is extremely quiet.

Old Material.—The improvement in the scrap market is only slight and where it exists is most marked in steel making grades. The quotation of \$16 to \$16.50 on heavy melting steel is being maintained, but does not appear over strong. Small lots have been sold at this range, but it is a question as to whether attractive tonnages would result in shading. One nearby mill is reported to have closed for 5000 tons at \$16.50. Blast furnace turnings are holding at \$12 to \$12.50, and some consumers report difficulty in obtaining this grade. While mills do not show an eagerness to buy, it is also true that dealers do not appear anxious to sell and apparently believe that the market soon will be stronger. Compressed sheet steel is easier and has declined back to \$14.50 to \$15. Cast iron wheels also are easier at \$16.50 to \$17. While no important transactions in rails for rolling are reported, this grade, in sympathy with the market for heavy melting steel, has advanced and now is quoted at \$17 to \$18.

We quote for delivery to consumer's mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel.....	\$16.00 to \$16.50
No. 1 cast, cupola size.....	16.00 to 16.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	17.00 to 18.00
Compressed sheet steel.....	14.50 to 15.00
Bundled sheets, sides and ends..	13.50 to 14.00
Railroad knuckles and couplers..	18.00 to 18.50
Railroad coil and leaf springs...	18.00 to 18.50
Low phosphorus blooms and billet ends	20.00 to 20.50
Low phosphorus plates and other material	18.50 to 19.00
Low phosphorus punchings.....	18.50 to 19.00
Steel car axles.....	20.50 to 21.00
Cast iron wheels.....	16.50 to 17.00
Rolled steel wheels.....	18.00 to 18.50
Machine shop turnings.....	11.00 to 11.50
Short shoveling turnings.....	12.00 to 12.50
Sheet bar crops.....	17.50 to 18.00
Heavy steel axle turnings.....	15.00 to 15.50
Short mixed borings and turnings	12.00 to 12.50
Heavy breakable cast.....	14.50 to 15.00
Cast iron borings.....	12.00 to 12.50
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	11.00 to 11.50
Railroad or automobile malleable scrap	16.00 to 16.50

Warehouse Prices, f.o.b. Pittsburgh	
	Base per Lb.
Tank plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes.....	2.90c.
Reinforced steel bars	2.90c.
Black sheets (No. 28 gage), 25 or more bundles	4.00c.
Galvanized sheets (No. 28 gage), 25 or more bundles	5.05c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.55c.
Cold-finished shafting and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats.....	4.10c.
Bands	3.60c.
Spikes, large	3.30c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Bolts, track	4.90c.
Wire, black soft annealed, base per 100 lb.	\$3.00
Wire, galvanized soft, base per 100 lb.	3.00
Common wire nails, per keg.....	3.00
Cement coated nails.....	3.05

Mechanical doublers are being installed on the first train of tin mills, consisting of six units, at the Warren plant of the Trumbull Steel Co. The equipment is furnished by the Aetna Foundry & Machine Co., also of Warren.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F. o. b. Pittsburgh or Youngstown

Billets and Blooms		Slabs		Wire Rods	
	Per Gross Ton		Per Gross Ton		Per Gross Ton
Rolling, 4-in. and over.....	\$35.00	8 in. x 2 in. and larger.....	\$35.00	*Common soft, base	\$45.00
Rolling, 2-in. and smaller.....	36.00	6 in. x 2 in. and smaller.....	36.00	Screw stock	\$5.00 per ton over base
Forging, ordinary	40.00			Carbon 0.20% to 0.40%	3.00 per ton over base
Forging, guaranteed	45.00			Carbon 0.41% to 0.55%	5.00 per ton over base
				Carbon 0.56% to 0.75%	7.50 per ton over base
				Carbon over 0.75%	10.00 per ton over base
				Acid	15.00 per ton over base
Sheet Bars		Skelp		*Chicago mill base is \$46. Cleveland mill base, \$45.	
	Per Gross Ton		Per Lb.		
Open-hearth or Bessemer.....	\$36.00	Grooved	1.90c.		
		Sheared	1.90c.		
		Universal	1.90c.		

Prices of Raw Materials

Ores		Ferromanganese		Fluxes and Refractories	
	Per Gross Ton		Per Gross Ton		Per Net Ton
Lake Superior Ores, Delivered Lower Lake Ports		Domestic, 80%, furnace or seab'd. \$88.00 to \$95.00		Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	
Old range Bessemer, 51.50% iron.....	\$4.55	Foreign, 80%, Atlantic or Gulf port, duty paid	88.00	No. 2 lump, Illinois and Kentucky mines..	\$20.00
Old range non-Bessemer, 51.50% iron.....	4.40			Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid,	\$17.25 to \$17.75
Mesabi Bessemer, 51.50% iron.....	4.40			Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/4% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50
Mesabi non-Bessemer, 51.50% iron.....	4.25				
High phosphorus, 51.50% iron.....	4.15				
Foreign Ore, c.i.f. Philadelphia or Baltimore		Domestic, 19 to 21%		Fire Clay	
	Per Unit	Domestic, 16 to 19%			Per 1000 f.o.b. Works
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian. 9.50c. to 10c.		Electric Ferrosilicon			High Duty Moderate Duty
Iron ore, Swedish, average 66% iron.....	9.50c.		Per Gross Ton Delivered		
Manganese ore, washed, 51% manganese, from the Caucasus.....	42c.		50%		
Manganese ore, Brazilian or Indian, nominal	42c. to 44c.		75%		
Tungsten ore, high grade, per unit, in 60% concentrates	\$11.25 to \$12.00				
Per Ton					
Chrome ore, Indian basic, 48% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard.....	\$22.00 to \$23.00				
Per Lb.					
Molybdenum ore, 85% concentrates of					
MoS ₂ , delivered	55c. to 60c.				
Coke		Bessemer Ferrosilicon		Silica Brick	
	Per Net Ton		Per Gross Ton		Per 1000 f.o.b. Works
Furnace, f.o.b. Connellsville prompt	\$2.75 to \$3.00		10%		
Foundry, f.o.b. Connellsville prompt	4.00 to 4.50		11%		
Foundry, by-product, Ch'go ovens	9.75				
Foundry, by-product, New England, del'd	12.00				
Foundry, by-product, Newark or Jersey City, delivered.....	9.75 to 10.77				
Foundry, Birmingham	5.50 to 6.00				
Foundry, by-product, St. Louis or Granite City	10.00				
Coal		Silvery Iron		Magnesite Brick	
	Per Net Ton		Per Gross Ton		Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.90		6%		
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75		7%		
Mine run gas coal, f.o.b. Pa. mines	1.90 to 2.10		8%		
Steam slack, f.o.b. W. Pa. mines.....	1.25		9%		
Gas slack, f.o.b. W. Pa. mines...	1.25 to 1.35				

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts		Bolts and Nuts		Large Rivets	
(Less-than-Carload Lots)		(Quoted with actual freight allowed up to but not exceeding 50c. per 100 lb.)		Base Per 100 Lb.	
(F.o.b. Pittsburgh, Cleveland, Birmingham and Chicago)		Per Cent Off List		F.o.b. Pittsburgh	
Per Cent Off List		Semi-finished hexagon nuts:		F.o.b. Cleveland	
Machine bolts, small, rolled threads... 60 and 10		1/4 in. and smaller, U. S. S.		F.o.b. Chicago	
Machine bolts, all sizes, cut threads. 50, 10 and 10		3/8 in. and larger, U. S. S.		Small Rivets	
Carriage bolts, smaller and shorter, rolled threads		Small sizes, S. A. E.		Per Cent Off List	
Carriage bolts, cut threads, all sizes... 50 and 10		S. A. E., 3/8 in. and larger.....		F.o.b. Pittsburgh	
Eagle carriage bolts.....		Stove bolts in packages.....		F.o.b. Cleveland	
Lag bolts		Stove bolts in bulk.....		F.o.b. Chicago	
Plow bolts, Nos. 3 and 7 heads.....		Tire bolts		Cap and Set Screws	
(Extra of 20% for other style heads)		Semi-Finished Castellated and Slotted Nuts		(Freight allowed up to but not exceeding 50c. per 100 lb.)	
Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in., 45, 10 and 5		(Actual freight allowed up to but not exceeding 50c. per 100 lb.)		Per Cent Off List	
Larger and longer sizes.....		(To jobbers and consumers in large quantities)		Milled cap screws.....	
Bolt ends with hot-pressed nuts.....		Per 100 Net		Milled standard set screws, case hardened, 80 and 5	
Bolt ends with cold-pressed nuts.....		S.A.E. U.S.S.		Milled headless set screws, cut thread.....	
Hot-pressed nuts, blank and tapped, square, 4.00c. per lb. off list		1/4-in.....		Upset hex. head cap screws, U. S. S. thread, 80, 10 and 10	
Hot-pressed nuts, blank or tapped, hexagons, 4.40c. per lb. off list		3/8-in.....		Upset hex. cap screws, S.A.E. thread, 80, 10 and 10	
C.p.c. and t. square or hex. nuts, blank or tapped		1/2-in.....		Upset set screws.....	
Washers*		3/4-in.....		Milled studs	
*F.o.b. Chicago and Pittsburgh.		1-in.....			
The discount on machine, carriage and lag bolts is 5 per cent more than above for car lots.		1 1/4-in.....			
On hot-pressed and cold-punched nuts the discount is 25c. more per 100 lb. than quoted above for car lots.		1 1/2-in.....			

Chicago

Specify Heavily Against Steel Contracts —Forward Buying Tendency

CHICAGO, June 22.—Specifications for soft steel bars for the first three weeks of June were 95 per cent ahead of the corresponding period of May and specifications for this week so far are considerably improved over the past seven days. Purchasers appear to be looking further into the future and are showing a tendency to build up stocks. In bars, shipments are equal to new buying and are lagging behind specifications.

Plates and shapes are not so active as during the previous week and neither specifications nor new buying are up to shipments. Boiler makers in this territory have taken good tonnages and structural awards for the week have added fully 15,000 tons to makers' books. The 7200 tons required for the Bankers' Building has not as yet been placed at the mill.

Mill operations in this district are well sustained at 88 to 90 per cent of ingot capacity and 28 steel mill blast furnaces are active out of a total of 36 in the district.

Track accessories are active and new inquiries include 8000 tons of tie plates, 5000 tons of angle bars, 17,000 kegs of spikes and 3000 kegs of bolts.

A lively interest in third and fourth-quarter buying of pig iron is shown and indications now are that contracting for the remainder of the year will largely take the place of spot buying, such as has been practised widely during the second quarter.

Pig Iron.—The feature is the greater interest shown by users in contracting for the next three to six months. During the first quarter of this year spot buying did not represent more than 10 per cent of shipments in this territory but during the second quarter 40 per cent of shipments were made on spot purchases. The present movement on the part of buyers leads producers to believe that the proportion for the third quarter will approximate that for first three months of the year. Shipments for June are running equal to May and furnace operation in this district is unchanged. The Falk Corporation, Milwaukee, has placed 2000 tons of low phosphorus iron at \$31.20 delivered at Milwaukee. A western Illinois melter is in the market for 2500 tons of foundry iron and 1800 tons of malleable for delivery over the remainder of the year. A Chicago user will take 1000 tons of malleable iron for delivery in the third and fourth quarters. Third-quarter iron being inquired for includes 900 tons of foundry for a western Illinois user, 1000 tons of basic for a Chicago melter, 1000 tons of foundry iron for a Milwaukee buyer and 1500 tons of Northern iron for a user west of Chicago. Contracts for the third and fourth quarters are being taken at \$21 for Northern No. 2 and small tonnages are bringing \$21.50. Carlot sales of Southern iron are being made at \$21, base, Birmingham, or \$27.01 delivered all rail, or \$25.18 delivered by rail and barge.

Quotations on Northern foundry high phosphorus and malleable iron are f.o.b. local furnace, and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards:

Northern No. 2 foundry, sil. 1.75 to 2.25	\$21.00 to \$21.50
Northern No. 1 foundry, sil. 2.25 to 2.75	21.50 to 22.00
Malleable, not over 2.25 sil.	21.00 to 21.50
High phosphorus	21.00 to 21.50
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	29.04
Southern No. 2 (all rail)	27.01
Southern No. 2 (barge and rail)	25.18
Low phos., sil. 1 to 2 per cent, copper free	30.70 to 31.20
Silvery, sil. 8 per cent	32.29
Ferrosilicon, 14 to 16 per cent	45.79

Ferroalloys.—A Chicago user has taken a carlot of ferromanganese at \$88, seaboard. Specifications for ferrosilicon are liberal and spiegeleisen, 19 to 21 per cent, is still quotable at \$32, Hazzard, for attractive tonnages and \$34 in small lots.

We quote 80 per cent ferromanganese, \$95.56, delivered Chicago; 50 per cent ferrosilicon, \$85, delivered; spiegeleisen, 18 to 22 per cent, \$39.76 to \$41.76, delivered Chicago.

Plates.—Demand has eased off within the week largely because tank users have momentarily taken care of their requirements. Railroad equipment buying is still uncertain, but there is a degree of hopefulness expressed here and there that the second quarter will see the railroads in the market on a large scale. Plates, shapes and bars totaling 3800 tons have been placed with a local mill for the 500 stock car bodies placed last week by the Chicago & Northwestern. The several large inquiries for freight car underframes are still open and this week the Wabash is asking for 40 caboose underframes. Boiler makers in the Chicago district have purchased close to 5000 tons of boiler plate. Chicago mill prices are steady at 2.10c. in tonnages and 2.20c. in lots of less than 100 tons.

The mill quotation on plates is 2.10c. to 2.20c. per lb., base, Chicago.

Sheets.—Both specifications and new buying are slightly heavier than during the previous week but on the whole this market lacks strength. Chicago delivered prices are 2.45c. to 2.55c. for blue annealed, 3.30c. to 3.40c. for black and 4.55c. to 4.65c. for galvanized.

Chicago delivered prices from mill are 3.30c. to 3.40c. for No. 28 black; 2.45c. to 2.55c. for No. 10 blue annealed; 4.55c. to 4.65c. for No. 28 galvanized. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Structural Material.—Although fresh structural inquiries are still in good volume, nevertheless there is a noticeable slackening up from the rate maintained earlier in the month. There is little or no improvement in the prices being obtained by fabricators, although on the whole shops are well supplied with work for two or three months. This appears to be due at least in part to a feeling of uncertainty as to the volume of work which will come out during the summer months, and also to the fact that lettings have not given fabrications well balanced shop schedules in all cases. The outstanding award of the week was to the American Bridge Co. for 7200 tons for the Bankers Building. Steel totaling 1950 tons for a Chicago bank building was purchased this week. Mills report that 12,000 tons of plain material was placed this week for a number of projects averaging 1000 tons to 3500 tons each. Mill prices for plain materials are steady at 2.10c. to 2.20c.

The mill quotation on plain material is 2.10c. to 2.20c. per lb. base, Chicago.

Sheet Bars.—Inquiry is active and the price is steady at \$36, mill.

Bars.—Specifications for soft steel bars during the third week in June are practically double those for the corresponding period of May. The bulk of this tonnage, however, is chargeable against contracts closed prior to the recent price advance. Third quarter contracting is progressing and it is particularly noticeable that users are now turning their attention toward building up at least conservative stocks. Soft steel bars are considerably more active in demand than are either plates or shapes. New buying is about equal to shipments and specifications are ahead of them. The Chicago district mill price is firm at 2.10c. in tonnages and 2.20c. in lots of less than 100 tons each. Third-quarter contracting for iron bars is progressing slowly and indications now are that users anticipate their requirements for the next three months to be about equal to that of the second quarter. Specifications from the railroads are fairly liberal, but other users are not active in the market. The mill price of 2c. is steady. The automobile industry continues to swing along at a good pace and specifications for alloy steel bars are fully equal to those of the previous week. The demand for concrete reinforcement is still drawing heavily upon makers of rail steel bars. On the whole, specifications are gradually becoming larger and are in excess of shipments. The volume of specifications for fence posts is undiminished and makers are experiencing some little difficulty in making shipments because of unbalanced stocks. One maker of rail steel bars is still operating double turn and another mill at Chicago Heights is operating single turn. Bed manufacturers still are holding back in making known their require-

ments beyond the next 30 to 45 days. The price of rail steel bars is steady at 2c., Chicago.

Mill prices per lb. are: Mild steel bars, 2.10c. to 2.20c., base, Chicago; common bar iron, 2c., base, Chicago; rail steel bars, 2c., base, Chicago.

Bolts, Nuts and Rivets.—Specifications are holding steady as compared with the previous week, and makers are experiencing little or no difficulty in closing contracts for the third quarter. On the whole industrial companies will not specify their full contracts for the quarter now closing but the railroads will take practically their full commitments. Shipments of practically all commodities are prompt and prices, with the exception of small rivets, are firm.

Wire Products.—Specifications from the manufacturing trade are well sustained and users are showing little or no hesitancy in placing third-quarter contracts. The jobbing trade continues to buy at about the rate maintained throughout the past two weeks. Chicago prices of plain wire and nails are steady and are shown on page 1809.

Cold-Rolled Strip.—Specifications are slightly expanded and the price is steady at 3.75c., Cleveland, or 4.05c., delivered Chicago.

Rails and Track Supplies.—Specifications for standard section rails continue heavy and producers are still finding some difficulty in meeting delivery schedules. Pressure at the Gary mill is indicated by the fact that last week 18,500 tons of rails were rolled. Purchases of rails for the week were light and new inquiry in this district totaled to only 2000 tons, but a decidedly active market is found in track supplies. The Southern Pacific is in the market for 5000 tons of tie plates, 13,000 kegs of spikes and 1000 kegs of bolts. The Pennsylvania track supply inquiry calls for 3000 tons of tie plates, 5000 tons of angle bars, 3750 kegs of spikes and 2000 kegs of track bolts. Chicago producers are holding steadily to the price of \$47 for steel tie plates. Specifications for iron tie plates are steady and a fair amount of new business has been taken in miscellaneous lots. The Southern Railway placed 10,000 tons of rails with the Tennessee Coal, Iron & Railway Co., and active inquiries now before the trade include 54,000 tons for the Norfolk & Western and 10,000 tons for the Great Northern.

Standard Bessemer and open-hearth rails, \$43; light rails, rolled from billets, \$36 to \$38 per gross ton, f.o.b. maker's mill.

Standard railroad spikes, 2.90c. to 3c. per lb. mill; track bolts with square nuts, 3.90c. to 4c. mill; steel tie plates, 2.35c. mill; angle bars, 2.75c. mill.

Reinforcing Bars.—All told there are more than 5000 tons of reinforcing bars on inquiry, the bulk of which the trade anticipates will be placed within a few weeks. The outstanding award is that of an apartment building requiring 1300 tons. Contractors working on large projects are busy but there does not appear to be enough of the smaller jobs to fill in well. The warehouse price of billet steel bars is weaker and

present quotations range from 2.50c. to 2.60c. New inquiry and recent awards are shown on page 1824.

Cast Iron Pipe.—Although both inquiry and buying are fairly active the price situation does not show strength and quotations for 6-in. diameter and larger are now within the range of \$40.50 to \$41.50, base Birmingham, or \$48.70 to \$49.70, delivered Chicago. Bookings are fairly large and in such volume that deliveries show no tendency to improve. The United States Cast Iron Pipe & Foundry Co. has taken 200 tons of 6, 8 and 12-in. Class B pipe for Oak Park, Ill., and Sullivan, Ill., awarded 805 tons of 6-in., 265 tons of 8-in. and 17 tons of 10-in., all Class B pipe, in 16-ft. lengths to the National Cast Iron Pipe Co. Milwaukee has one inquiry out for over 1500 tons of 20 and 30-in. pipe and is now asking for prices on 650 tons of 16-in. Class C pipe and 40 tons of 16-in. fittings. Milton, Ind., will open bids June 24 on 160 tons of 4, 6 and 8-in. Class B pipe, and Fulton, Ill., will receive tenders up to June 23 on 180 tons of 6-in. and 54 tons of 4-in. Class C pipe. Bids are due on June 23 on 1000 tons of 6, 8 and 12-in. Class B pipe for Palatine, Ill., and Wheaton, Ill., will open bids this week on 400 tons of 4 and 6-in. Class B pipe.

We quote per net ton, delivered Chicago, as follows: Water pipe, 4-in., \$52.70 to \$53.70; 6-in. and over, \$48.70 to \$49.70; Class A and gas pipe, \$4 extra.

Coke.—Foundry specifications are liberal and there is no abatement in the rate of shipments. All ovens in this district are lighted and makers are virtually without stocks. Quotations are \$9.75 at ovens, and \$10.25, delivered in the Chicago switching district.

Old Material.—There is greater activity in the scrap market than for some time past and although buyers are partly responsible for this, it is largely due to the anxiety of dealers to obtain various grades for delivery on old contracts. Steel angle bars have sold this week at \$15.50 per gross ton, delivered, and a user has taken a good tonnage of brake shoes at \$13 per net ton, delivered. Bids for railroad lists are high and the Santa Fe received this week \$17 gross, delivered, for rerolling rails. Low phosphorus grades are not more active but are going at better prices, and inquiry for malleable scrap shows a sharp upturn. An industrial plant is offering to the trade 1000 tons of borings.

We quote delivered in consumers' yards, Chicago and vicinity, all freight and transfer charges paid for all items except relaying rails, including angle bars to match, which are quoted f.o.b. dealers' yards:

Per Gross Ton

Heavy melting steel.....	\$12.50 to \$13.00
Frogs, switches and guards, cut apart, and miscellaneous rails.....	14.00 to 14.50
Shoveling steel.....	12.50 to 13.00
Hydraulic compressed sheets.....	10.50 to 11.00
Drop forge flashings.....	9.50 to 10.00
Forged, cast and rolled steel car wheels.....	16.50 to 17.00
Railroad tires, charging box size.....	16.75 to 17.25
Railroad leaf springs, cut apart.....	16.50 to 17.00
Steel couplers and knuckles.....	15.50 to 16.00
Coil springs.....	17.00 to 17.50
Low phos. punchings.....	15.50 to 16.00
Axle turnings, foundry grade.....	13.50 to 14.00
Axle turnings, blast fur. grade.....	11.50 to 12.00
Relaying rails, 56 to 60 lb.....	25.00 to 26.00
Relaying rails, 65 lb. and heavier.....	26.00 to 31.00
Rerolling rails.....	16.00 to 16.50
Steel rails, less than 3 ft.....	16.50 to 17.00
Iron rails.....	14.00 to 14.50
Cast iron borings.....	10.25 to 10.75
Short shoveling turnings.....	10.25 to 10.75
Machine shop turnings.....	7.00 to 7.50
Railroad malleable.....	17.00 to 17.50
Agricultural malleable.....	15.50 to 16.00
Angle bars, steel.....	15.00 to 15.50
Cast iron car wheels.....	15.50 to 16.00

Per Net Ton

No. 1 machinery cast.....	16.50 to 17.00
No. 1 railroad cast.....	15.50 to 16.00
No. 1 agricultural cast.....	15.25 to 15.75
Stove plate.....	13.50 to 14.00
Grate bars.....	13.50 to 14.00
Brake shoes.....	12.50 to 13.00
Iron angle and splice bars.....	13.50 to 14.00
Iron arch bars and transoms.....	19.00 to 19.50
Iron car axles.....	24.00 to 24.50
Steel car axles.....	17.50 to 18.00
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	11.25 to 11.75
No. 1 busheling.....	9.75 to 10.25
No. 2 busheling.....	6.00 to 6.50
Locomotive tires, smooth.....	16.00 to 16.50
Pipes and flues.....	8.50 to 9.00

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Mild steel bars.....	3.00c.
Reinforcing bars, billet steel.....	2.60c.
Cold-finished steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Hoops.....	4.15c.
Bands.....	3.65c.
No. 28 black sheets.....	4.10c.
No. 10 blue annealed sheets.....	3.50c.
No. 28 galvanized sheets.....	5.25c.
Standard railroad spikes.....	3.55c.
Track bolts.....	4.55c.
Structural rivets.....	3.50c.
Boiler rivets.....	3.70c.
	Per Cent Off List
Machine bolts.....	.50 and 5
Carriage bolts.....	.47½
Coach or lag screws.....	.55 and 5
Hot-pressed nuts, square, tapped or blank.....	3.25c. off per lb.
Hot-pressed nuts, hexagons, tapped or blank.....	3.75c. off per lb.
No. 8 black annealed wire, per 100 lb.....	\$3.30
Common wire nails, base, per keg.....	3.05
Cement coated nails, base, per keg.....	3.05

Cleveland

Sales of 75,000 Tons of Pig Iron—Semi-Finished Steel on Cleveland Basis

CLEVELAND, June 22.—The better volume of business in finished steel established a few weeks ago is being well maintained. Steel bar specifications are coming out in good volume against 1.90c., Pittsburgh contracts. Most of the trade is covered at that price and some of the material under these contracts will be carried over into the third quarter. Small lot sales of bars are being made at 2c. and some of the mills are trying to get 2.10c. for small lot orders. Contracts in rather limited number are being taken at 2c. for the third quarter. Plate consumers in this territory are busier than they have been and the demand for small lots of plates has improved. The market is firm at 1.90c., Pittsburgh. The advance on structural material to 2c., Pittsburgh, by leading mills, has not yet been tested, as most buyers were protected at 1.90c. Specifications from the automotive industry are keeping up to recent volume, but motor car builders are not ordering material very far ahead. New inquiry in the building field is moderate, but considerable work is in prospect.

Pig Iron.—The market continues very active, although sales were not so heavy the past week as during the previous week. Business taken by Cleveland interests in foundry and malleable iron during the week aggregated about 75,000 tons and is well distributed in Ohio, Michigan and Indiana. Many buyers seem to feel that the bottom of prices has been reached and are covering for the entire last half, about half the sales made during the week being for the remainder of the year. Sales did not include many large lots, although one was for over 5000 tons. Several orders came from Cleveland foundries, including one for 1500 tons. A great deal of inquiry is still coming out. One producer now has inquiries aggregating 100,000 tons. A Muncie, Ind., melter is inquiring for 3000 tons of malleable iron. There is virtually no change in the price situation. While producers generally are holding to recent minimum quotations, little effort is being made to get better prices, although one Valley furnace, which has been on an \$18 basis, has advanced its price to \$18.50. The bulk of the business during the week was taken on the basis of \$18, Lake or Valley furnace. In Michigan the market is unchanged at \$19.50 to \$20. Cleveland furnaces continue to quote \$19, furnace, for local delivery. An Eastern producer is reported to have quoted as low as \$21 on low phosphorus iron in competition with a Valley furnace which is holding to \$27.50. A Pittsburgh district consumer is inquiring for 1000 tons of this grade.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and \$6.01 from Birmingham:

Basic, Valley furnace.....	\$18.00
N'th'n No. 2 fdy., sil. 1.75 to 2.25.....	19.50
Southern fdy., sil. 1.75 to 2.25.....	\$26.51 to 27.01
Malleable	19.50
Ohio silvery, 8 per cent.....	30.52
Standard low phos., Valley furnace	27.50

Iron Ore.—Ore is now moving at a very good rate and June shipments will reach 8,400,000 tons, according to late estimates, or 700,000 tons more than during the same month last year. The daily consumption of Lake Superior ore fell off slightly in May, although

the total consumption exceeded that of April. The amount consumed was 5,194,146 tons, an increase of 2527 tons over the previous month. In May last year 4,357,491 tons was consumed. The amount of ore on hand at furnaces June 1 was 13,063,435 tons, and the amount at furnaces and Lake Erie docks was 17,387,379 tons, as compared with 21,049,160 tons on June 1 last year. Ore consumption last month by central district furnaces was 2,761,952 tons, an increase of 4863 over April. Lake front furnaces took 2,151,765 tons, a gain of 6278 tons. All rail furnaces received 135,530 tons, a gain of 1987 tons, and Eastern furnaces, 144,899 tons, a decrease of 10,601 tons. There were 195 furnaces using Lake ore in blast May 31, a decrease of 6 for the month.

Fluorspar.—The market on gravel fluorspar is somewhat firmer, as little if any of this material is now available at \$17.50. Leading producers have been holding firmly to \$18 for several weeks. Another lot of 1000 tons has been taken at that price.

Alloy Steel.—Demand is holding up fairly well from the automotive industry and some of the mills are filled up with orders for three to five weeks. S. A. E. series 2500, 5 per cent nickel steel has declined, but prices on other grades are being well maintained.

Semi-Finished Steel.—A Cleveland producer who has recently been quoting prices on semi-finished steel with a Youngstown base, has named \$36, Cleveland, for sheet bars and \$35, Cleveland, for slabs and large billets for the third quarter, or the prices that have been prevailing for the present quarter with Pittsburgh and Youngstown as a basing point. One Cleveland mill has already covered on this basis. With Cleveland as a basing point, Youngstown and Pittsburgh district mills are not inclined to cut prices by absorbing the freight differential on semi-finished steel in order to get into Cleveland on an equal footing. Very little third-quarter inquiry has as yet come out.

Sheets.—Some effort has been made to stiffen up the sheet market, but with very little if any success, although the extremely low price of 2.90c., Pittsburgh, on black sheets seems to have disappeared. The price range at present is 3c. to 3.15c. with 3.05c. rather common, especially for the heavier gages on which that price is also being named for the third quarter. Some third-quarter business has been taken at 3c. Blue annealed sheets are holding fairly well at 2.30c. On galvanized sheets, 4.25c., Pittsburgh, has become the more common price. However, these are being offered in car lots at 4.30c., Ohio mill. Consumers as a rule are limiting their purchases to early needs, the low prices not having brought out very many third-quarter contracts.

Bolts, Nuts and Rivets.—Specifications for bolts and nuts have been better the past two weeks than during the previous few weeks, but consumers are ordering in small lots for quick shipment. A good volume of contracts has been taken for the third quarter at present discounts. Many rivet consumers have also covered for the third quarter at \$2.60 per cwt. for large rivets. Small rivets are moving well. For the general run of orders 70 and 10 per cent discount is the ruling price, although large lots are bringing out an additional 5 per cent discount.

Cold-Rolled Strip Steel.—Mills are getting a fair volume of specifications from the automotive industry and are comfortably filled with orders. The market is fairly well stabilized at 3.60c., Cleveland and Pittsburgh, for good lots and 3.75c. for small lots.

Warehouse Business.—Sheets out of stock are again irregular, not holding to the recent reductions in regular quotations. Concessions of \$5 a ton on galvanized and \$3 a ton on blue annealed are reported. Other warehouse prices are firm. Orders are plentiful but they are small in size, making the aggregate business very light.

Reinforcing Bars.—Inquiry is fair for lots of 100 tons and under, but no awards of any size are reported. Mills are now holding to 2c., Pittsburgh, for billet steel bars. Rail steel bars are unchanged at 1.80c., mill.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes.....	3.00c.
Mild steel bars.....	3.00c.
Cold-finished rounds and hexagons.....	3.90c.
Cold-finished flats and squares.....	4.40c.
Hoops and bands.....	3.65c.
No. 28 black sheets.....	3.85c.
No. 10 blue annealed sheets.....	3.15c.
No. 28 galvanized sheets.....	5.00c.
No. 9 annealed wire, per 100 lb.....	\$3.00
No. 9 galvanized wire, per 100 lb.....	3.45
Common wire nails, base, per keg.....	3.00

Coke.—Third quarter contracts are being taken for Ohio by-product foundry coke. This is quoted at \$7.50 for June shipment. Connellsville foundry coke is dull, with prices unchanged at \$4 to \$5.50. Considerable inquiry is coming out for cargo domestic by-product coke for shipment to the Northwest, and for this producers are asking \$4.25 for nut and \$4.75 for egg, an advance of 25 cents a ton.

Old Material.—A firmer tone has developed among dealers, but this has not extended to the consumers, nor have there been any advances in prices. Dealers who are buying scrap against contracts are finding that material is not so plentiful as it has been, as there is some disposition to keep the scrap for better prices. Mills have good stocks and are showing no interest in the market. The only grades that are noticeably active are borings and turnings and machine shop turnings.

We quote per gross ton delivered consumers' yards in Cleveland:

Heavy melting steel.....	\$13.50 to \$14.00
Rails for rolling.....	16.25 to 16.50
Rails under 3 ft.....	17.00 to 17.50
Low phosphorus billet, bloom and slab crops.....	18.00 to 18.50
Low phosphorus sheet bar crops..	18.00 to 18.75
Low phosphorus plate scrap.....	18.00
Light plate scrap.....	17.50
Low phosphorus forging crops...	16.75 to 17.25
Cast iron borings.....	11.00 to 11.50
Machine shop turnings.....	9.50 to 10.00
Mixed borings and short turnings	11.00 to 11.50
Compressed sheet steel.....	13.00 to 13.25
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	13.50 to 14.00
Railroad malleable.....	18.00 to 18.50
Light bundled sheet stampings...	11.00 to 11.50
Steel axle turnings.....	12.50 to 13.00
No. 1 cast.....	16.50 to 17.00
No. 1 busheling.....	11.25 to 11.75
No. 2 busheling.....	10.50 to 11.00
Drop forge flashings, 15 in. and under.....	11.50 to 12.00
Railroad grate bars.....	12.50 to 13.00
Stove plate.....	11.50 to 12.00
Pipes and flues.....	10.00 to 10.50

New York

Sharper Competition by Buffalo and Eastern Furnaces—Steel Bookings Increase

NEW YORK, June 22.—Although it is estimated that more than 15,000 tons of pig iron has been purchased in this district during the past week, new inquiry has been sufficient to bring the total tonnage now in the market to 20,000 or 25,000 tons. While \$21.50 per ton, furnace, is being adhered to in the Philadelphia district by eastern Pennsylvania furnaces, except for equalization of freights and absorption of differentials, New England and Buffalo competition has brought out as low as \$21 per ton. The Buffalo market shows softness, with quotations on desirable business ranging from \$19 down to less than \$18.50 per ton. Producers at Troy and Port Henry, N. Y., and Everett, Mass., have been active competitors for New England tonnage, with Genesee furnace at Charlotte, N. Y., seeking a backlog for an operation that will use up the ore on hand. One Eastern producer has been quoting on a furnace basis, gaging the price by the level of foreign competition in the Boston district. German foundry iron is quoted by importers at \$20.50 to \$20.75 per ton, c.i.f., duty paid. Dutch iron is understood to be higher. The inquiry of the Richardson & Boynton Co., Dover, N. J., has been increased from 4300 tons for the third quarter to 8600 tons of No. 2 and No. 2X for delivery over the last half. Whether the recent low quotations of Buffalo producers for third quarter will apply on fourth quarter business is yet to be seen. A large consumer whose buying is done in New York is inquiring for about 10,000 tons for one plant and 1500 tons of foundry for another for third quarter. A Newark, N. J., foundry has closed on 3000 tons of foundry at slightly lower than \$21.50, base. Two inquiries from consumers in the metropolitan district are for 500 tons and 600 tons, respectively. An export lot of 200 tons of foundry iron was closed in the past week by the Anaconda Copper Mining Co., New York. A Connecticut consumer has purchased about 2000 tons of basic. A Bridgeport, Conn., foundry has closed for

about 1000 tons of foundry, and a Massachusetts manufacturer of boilers is reported to have purchased about 10,000 tons.

We quote per gross ton delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.54 from Virginia:

East Pa. No. 2 fdy., sil. 1.75 to 2.25	\$23.52 to \$24.02
East Pa. No. 2X fdy., sil. 2.25 to 2.75	24.02 to 24.52
East Pa. No. 1X fdy., sil. 2.75 to 3.25	24.52 to 25.02
Buffalo fdy., sil. 1.75 to 2.25 (all-rail)	23.41 to 23.91
Buffalo fdy., sil. 1.75 to 2.25 (by barge canal, del'd alongside in lighterage limits, N. Y. and Brooklyn)	22.75
No. 2 Virginia fdy., sil. 1.75 to 2.25	27.54 to 28.04

Ferroalloys.—The market is quiet, there being practically no demand. Consumers of ferromanganese are well covered, many of them having contracted for supplies to the end of the year. A leading domestic pro-

Warehouse Prices, f.o.b. New York

	Base per Lb.	
Plates and structural shapes.....	3.34c.	
Soft steel bars and small shapes.....	3.24c.	
Iron bars	3.24c.	
Iron bars, Swedish charcoal.....	7.00c. to 7.25c.	
Cold-finished steel shafting and screw stock—		
Rounds and hexagons.....	4.00c.	
Flats and squares.....	4.50c.	
Cold-rolled strip, soft and quarter hard...	6.25c.	
Hoops	4.49c.	
Bands	3.99c.	
Blue annealed sheets (No. 10 gage).....	3.89c.	
Long terme sheets (No. 28 gage).....	6.35c.	
Standard tool steel.....	12.00c.	
Wire, black annealed.....	4.50c.	
Wire, galvanized annealed.....	5.15c.	
Tire steel, 1½ x ¼ in. and larger.....	3.30c.	
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.	
Open-hearth spring steel, bases... 4.50c. to 7.00c.		
Per Cent Off List		
Machine bolts, cut thread.....	40 and 10	
Carriage bolts, cut thread.....	30 and 10	
Coach screws	40 and 10	
Boiler Tubes—	Per 100 Ft.	
Lap welded steel, 2-in.....	\$17.33	
Seamless steel, 2-in.....	20.24	
Charcoal iron, 2-in.....	25.00	
Charcoal iron, 4-in.....	67.00	
Discounts on Welded Pipe		
Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12
Wrought Iron—		
½-in. butt	4	+19
¾-in. butt	11	+9
1-1½-in. butt	14	+6
2-in. lap	5	+14
3-6-in. lap	11	+6
7-12-in. lap	3	+16
Tin Plate (14 x 20 in.)		
	Prime	Seconds
Coke, 100-lb. base box.....	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00
Terne Plate (14 x 20 in.)		
IC—20-lb. coating	\$10.00 to \$11.00	
IC—30-lb. coating	12.00 to 13.00	
IC—40-lb. coating	13.75 to 14.25	
Sheets, Box Annealed—Black, C. R. One Pass†		
	Per Lb.	
Nos. 18 to 20.....	4.15c. to 4.30c.	
Nos. 22 and 24.....	4.20c. to 4.35c.	
No. 26	4.25c. to 4.40c.	
No. 28*	4.35c. to 4.50c.	
No. 30	4.55c. to 4.70c.	
Sheets, Galvanized†		
	Per Lb.	
No. 14	4.45c. to 4.60c.	
No. 16	4.60c. to 4.75c.	
Nos. 18 and 20.....	4.75c. to 4.90c.	
Nos. 22 and 24.....	4.90c. to 5.05c.	
No. 26	5.05c. to 5.20c.	
No. 28*	5.35c. to 5.50c.	
No. 30	5.85c. to 6.00c.	

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
†Lower price is for lots of 50 bundles or more.

ducer continues to name \$88, furnace, and another holds to \$95, furnace.

Finished Steel.—Recent action by the leading makers of structural shapes in advancing quotations \$2 a ton, following the advance on steel bars in the same amount a few weeks before, has at least convinced buyers that the summer will bring no price declines on these products and there has been a general covering on outstanding commitments and protections, with the result that orders have been surprisingly large; in fact the sales of some New York offices this month will probably exceed those of May. One of the leading producers of structural shapes reports that the advance in price has brought out a large volume of specifications against contracts which expire at the end of the month and that June, from present indications, will be the record month of the year so far in total bookings of shapes by that company. The continued strength of the plate market at 1.90c., Pittsburgh, contrary to precedent of the last few years, together with intimations by plate producers of a probable advance to 2c., has brought an increased volume of plate business within the week, and quite a number of consumers without solicitation have asked for third quarter contracts at the present price. At least two makers of plates and several makers of steel bars are declining to write contracts for the entire third quarter, limiting such contracts to July and August. This is an innovation to which some consumers and jobbers have taken exception. Some of the mills are stressing the need of selling steel at more profitable prices and they see a possibility of getting a further advance on plates, shapes and bars by August if the demand for autumn consumption will sustain such action. While sheet prices continue weak, there are intimations of advances by some makers. Occasional sales of black sheets are being made at 3c. and 3.05c., Pittsburgh, but a sale of 200 tons at 3.10c., Pittsburgh, seems to confirm statements by the trade that prices below 3.10c. are not representative of a majority of the sales. New concessions on cold rolled strip steel have appeared, amounting in some cases to \$2 and \$3 a ton. The presence of railroad officials at their annual conventions at Atlantic City in the past two weeks may account for the small volume of orders and inquiries for railroad equipment. Lettings of structural steel work are keeping up in fairly good volume.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.34c. per lb.; plates, 2.24c.; structural shapes, 2.24c. to 2.34c.; bar iron, 2.24c.

Cast Iron Pipe.—Purchase of small lots of pressure pipe by private gas and water companies continues in good volume, but municipal inquiries are slow in developing. The outstanding municipal inquiry on which bids are being taken is 2500 tons of 6-in., 8-in. and 12-in. pipe, about 250 tons of fittings and a number of fire hydrants and other castings for the Department of Purchase, New York, bids opening June 28. Prices continue quite firm with most makers well booked with tonnage for the next 60 to 90 days, except on some of the larger sizes.

We quote pressure pipe per net ton, f.o.b. New York in carload lots, as follows: 6-in. and larger, \$50.60 to \$52.60; 4-in. and 5-in., \$55.60 to \$57.60; 3-in., \$65.60 to \$67.60; with \$5 additional for Class A and gas pipe.

Warehouse Business.—If purchasing from stock continues at the present level throughout the month, most jobbers expect June to equal May, which was the most active month since the first of the year. Structural material is moving out of stock in fairly sizable lots and a good demand for sheets is reported. Prices continue unchanged although there is a slight inclination to grant the 50-bundle price on black and galvanized sheets when the tonnage is slightly smaller.

Coke.—Demand for foundry coke is better but prices continue at about \$4.25 per net ton for prompt shipment. Furnace coke ranges from \$3 to \$3.25 per ton, Connellsville. Standard foundry is quoted at \$7.91 to \$9.41 per net ton, delivered Newark and Jersey City, N. J., \$8.03 to \$9.53, delivered northern New Jersey and \$8.79 to \$10.29, delivered New York or Brooklyn, N. Y. By-product continues at \$9.75 to \$10.77, delivered Newark or Jersey City, N. J.

Old Material.—Despite the tendency of the market to decline on sales to eastern Pennsylvania consumers, the buying prices of brokers have not decreased proportionately. No. 1 heavy melting steel is still quotable at \$14.50 to \$15 per ton, delivered eastern Pennsylvania, with a few brokers buying small lots occasionally at \$14.25 or less. Holders of scrap are reported to be less inclined to sell at present levels, but brokers with contracts are evidently encountering but little difficulty in filling their orders. On other grades than heavy melting steel, decline in the mill buying price has been reflected in a lowering of the brokers' offers, as in the case of specification pipe, which is being purchased at \$14 per ton, delivered Lebanon, Pa. Most of the current buying prices are unchanged from last week.

Buying prices per gross ton, New York, follow:

Heavy melting steel (yard).....	\$9.75 to \$10.25
Heavy melting steel (railroad or equivalent)	11.25 to 11.75
Rails for rolling.....	11.75 to 12.25
Relaying rails, nominal.....	23.00 to 24.00
Steel car axles.....	18.50 to 19.00
Iron car axles.....	21.50 to 22.00
No. 1 railroad wrought.....	13.00 to 13.50
Forge fire	9.50 to 10.00
No. 1 yard wrought, long.....	11.50 to 12.00
Cast borings (steel mill).....	9.25 to 9.75
Cast borings (chemical).....	12.00 to 13.00
Machine shop turnings.....	9.00 to 9.50
Mixed borings and turnings.....	9.25 to 9.75
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	10.25 to 10.75
Stove plate (steel mill).....	9.25 to 9.75
Stove plate (foundry).....	10.25 to 10.50
Locomotive grate bars.....	10.25 to 11.25
Malleable cast (railroad).....	16.00 to 16.50
Cast iron car wheels.....	12.25 to 12.75
No. 1 heavy breakable cast.....	12.00 to 13.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building material, etc.), cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	14.00 to 14.50

Philadelphia

Weakness in Pig Iron—Steel Demand Keeps Up at a Good Rate

PHILADELPHIA, June 22.—Due largely to keen competition from Buffalo and other outside producing districts, the eastern Pennsylvania pig iron market has weakened to the extent of at least 50c. a ton. This has not developed on sales in the immediate Philadelphia district, which have remained on the basis of \$21.50, furnace, for the base grade of foundry iron, but in selling to points in New York, New Jersey and New England the furnaces of this district have been willing to concede something when they had to, and such concessions have usually been about a half dollar per ton.

Efforts of the steel companies to stiffen prices on structural shapes and bars, together with intimations that plates may be advanced \$2 a ton, have driven in considerable tonnage in the last week. Bookings of structural shapes by the leading Eastern producer are expected to be the largest of any month this year. Two Eastern mills have advanced prices on shapes, following the lead of the Bethlehem Steel Corporation, Carnegie Steel Co., and the Jones & Laughlin Steel Corporation. One of these Eastern mills now names 1.90c. and the other 2c., Pittsburgh.

Bids to be opened June 28 by the Pennsylvania Railroad on 30,000 tons of miscellaneous steel products will be watched with interest by all of the steel companies with a view to determining how rigidly the trade will adhere to recent price advances on bars and structural shapes. The Norfolk & Western, Chesapeake & Ohio and Seaboard Air Line are in the market for their usual quarterly requirements, totaling several thousand tons of various products.

Pig Iron.—Most of the current inquiry for pig iron for prompt shipment and third quarter comes from consumers in the New York, New Jersey and New England territories, where the furnaces of this dis-

trict have had to meet keen competition of furnaces at Buffalo, Troy, N. Y., and Boston. Not all of the eastern Pennsylvania furnaces have been anxious for such business when getting it meant departing from the \$21.50 base price on foundry grades, but some business has been taken at prices which figure back to \$21 or less at eastern Pennsylvania stacks. These concessions are generally referred to as "equalization of freight rates," but the fact remains that furnaces of this district cannot compete with \$19 Buffalo iron at certain points without conceding something. On business originating in the immediate Philadelphia district, where outside competition is not a factor, prices have remained at \$21.50, furnace, for No. 2 plain and at \$22 for No. 2X. The Pennsylvania Railroad is asking for open bids on 800 tons of pig iron, bids to close June 25. The National Radiator Co., Trenton, N. J., has not yet closed on 1500 tons of foundry grades for third quarter. The Westinghouse Electric & Mfg. Co. wants 400 tons for its Essington, Pa., foundry. The most interesting inquiry before the trade is from the Richardson & Boynton Co., Dover, N. J., for 8600 tons of No. 2 plain and No. 2X for second half, but the business may go to a Buffalo furnace. The American Tube & Stamping Co., Bridgeport, Conn., now owned by the Stanley Works, bought 1500 tons of basic at a price about \$22, delivered.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to \$1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$22.26 to \$22.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.76 to 23.26
East. Pa. No. 1X.	23.26 to 23.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.67 to 28.67
Virginia No. 2X, 2.25 to 2.75 sil.	28.17 to 29.17
Basic delivered eastern Pa.	21.25 to 21.50
Gray forge	22.00 to 22.50
Malleable	22.50 to 23.00
Standard low phos. (f.o.b. furnace)	22.00 to 23.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00

Ferromanganese.—The market is dull. One producer quotes \$88, furnace, and another is holding to \$95, furnace.

Billets.—Steel companies are maintaining quotations of \$35, Pittsburgh, on rerolling billets and \$40 on ordinary forging billets, but there are few sales.

Plates.—While there are discussions between plate manufacturers and their customers as to the possibility of a price advance of \$2 a ton to 2c., Pittsburgh, there is nothing to indicate that such an advance is imminent. However, buyers seemingly have been persuaded of the fact that plate prices are not apt to decline, and there has been more of a disposition to contract for third quarter at the present price. Mills are not urging contracts and the initiative has come largely from the buyer. At least two mills in this district will not contract for more than 60 days, believing that an advance will surely take place by August, if it does not come sooner. The unanimity with

which plate producers are adhering to quotations of 1.90c., Pittsburgh, has given the market a tone of strength it has not had in years, it having been a normal expectation that plate prices would be the first to reflect the oncoming of any period of lessened activity, such as might be expected, for example, in the summer months.

Structural Shapes.—Two of the Eastern mills have followed the advance of the larger producers on shapes. One which was quoting 1.80c., Pittsburgh, now names 1.90c. as its minimum, while the other now quotes 2c. The 2c. price has applied so far only on occasional carload lots where buyers had no protection, but the announcement of it has driven in a considerable volume of business at 1.90c., and some stock orders have been placed by fabricators and jobbers where such has not been the rule recently, as such distributors have depended on the mills to carry their stocks.

Bars.—With contracting for third quarter now on the calendar, mills are adhering firmly to 2c., Pittsburgh, on steel bars. Consumers and jobbers who have second quarter contracts at 1.90c. are specifying freely, and the tonnage coming to the mills in the last week has been fairly large. It is apparent that many buyers will have enough 1.90c. bars coming to them to carry them well through July, and possibly in some cases into August. However, on current carload sales 2c., Pittsburgh, has been obtained in a sufficient number of cases to establish that price. Bar iron remains at 2.22c., Philadelphia.

Sheets.—Prices on sheets seem to have reached a resistance point. At least no further concessions are reported. Galvanized sheets at a minimum of 4.30c. and blue annealed at 2.30c. have been considered by buyers as low enough to warrant the assumption that there may be no further decline. On black sheets the range is 3c. to 3.15c., with the majority of orders probably at 3.10c. The sales at 3c. are still the exception rather than the rule.

Warehouse Business.—Local warehouses have reduced prices on sheets in line with recent reductions of mill prices.

Imports.—Last week's receipts of foreign pig iron at this port totaled 7733 tons, of which 4725 tons came from Germany and 3008 tons from India. Other imports were: Iron ore from Algeria, 12,763 tons; structural steel from Germany, 50 tons; steel tubes from Germany, 17 tons.

Old Material.—The scrap market has been marking time in the past week. There has been nothing to indicate any strength in the market, but it is not any weaker. Brokers look for a slightly upward tendency, but with summer coming on do not see any marked advance in prospect.

We quote for delivery, consuming points in this district, as follows:

No. 1 heavy melting steel	\$14.50 to \$15.50
Scrap rails	15.00 to 15.50
Steel rails for rolling	15.50 to 16.00
No. 1 low phos., heavy, 0.04 per cent and under	19.00 to 20.00
Couplers and knuckles	17.50 to 18.00
Roller steel wheels	17.50 to 18.00
Cast iron car wheels	17.00 to 17.50
No. 1 railroad wrought	16.50 to 17.00
No. 1 yard wrought	16.00 to 16.50
No. 1 forge fire	13.00 to 13.50
Bundled sheets (for steel works)	13.00 to 13.50
Mixed borings and turnings (for blast furnace)	12.50 to 13.00
Machine shop turnings (for steel works)	13.00 to 13.50
Machine shop turnings (for rolling mills)	13.50 to 14.00
Heavy axle turnings (or equivalent)	14.00 to 14.50
Cast borings (for steel works and rolling mill)	13.00 to 13.50
Cast borings (for chemical plant)	15.00 to 15.50
No. 1 cast	17.00 to 18.00
Heavy breakable cast (for steel works)	16.00 to 16.50
Railroad grate bars	13.50 to 14.00
Stove plate (for steel works)	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications)	14.50 to 15.00
Shafting	20.00 to 21.00
Steel axles	21.50 to 22.00

Jenkins Brothers, valve manufacturers, 80 White Street, New York, has brought out a modulating radiator valve for one or two-pipe low pressure steam, vapor and vacuum heating systems.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Tank steel plates, $\frac{3}{4}$ -in. and heavier	2.80c. to 3.00c.
Tank steel plates, $\frac{1}{2}$ -in.	3.00c.
Structural shapes	2.75c. to 2.90c.
Soft steel bars, small shapes and iron bars (except bands)	3.00c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, $1\frac{1}{2} \times 1\frac{1}{2}$ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforcing steel bars, square, twisted and deformed	3.00c.
Cold-finished steel, rounds and hexagons	4.00c.
Cold-finished steel, squares and flats	4.50c.
Steel hoops	4.00c. to 4.25c.
Steel bands, No. 12 gage to $\frac{1}{4}$ -in., inclusive	3.75c. to 3.90c.
Spring steel	5.00c.
No. 28 black sheets	4.35c.
No. 10 blue annealed sheets	3.40c.
No. 28 galvanized sheets	5.55c.
Diamond pattern floor plates— $\frac{1}{4}$ -in.	5.30c.
$\frac{1}{2}$ -in.	5.50c.
Rolls	3.20c.
Tool steel	8.50c.
Swedish iron bars	6.00c. to 6.50c.

San Francisco

Plate Quotations Show Firmer Tendency —Federal Mokelumne Permit Granted

SAN FRANCISCO, June 19 (*By Air Mail*).—An Eastern mill which has been quoting plates at 2.25c., c.i.f. Coast ports, has advanced its price \$1 a ton and is now asking 2.30c. This, and the report of higher quotations being made in some of the Eastern markets, coupled with other developments during the week, have tended to strengthen the belief that a general price stiffening in both plates and shapes is imminent. However, early in the week, 2.20c. is understood to have been quoted on a certain tonnage of plates, but this figure is not known to have been named since. In shapes 2.30c. is still considered possible on desirable tonnages. Eastern mills continue to quote soft steel bars at 2.35c. c.i.f. Coast ports, and local producers are asking 2.35c. to 2.40c., f.o.b. mills.

The week's buying has developed few outstanding features, and no inquiries of importance have come into the market. The local carpenters' strike, which started April 1, is still unsettled, and this continues to retard construction work.

The Federal Power Commission has granted a permit to the East Bay Municipal Utility District, Oakland, Cal., to build the proposed Lancha Plana dam on the Mokelumne River, although it has not yet approved the district's plans for constructing the dam. However, it is generally considered that this is merely a matter of detail. The State Division of Water Rights has issued a permit to the district to divert an additional 375 cu. ft. of water per sec. from the Mokelumne at the proposed Lancha Plana dam for the development of hydroelectric power. With a permit previously granted for appropriation of 310 cu. ft. per sec. for municipal purposes, the permit for the additional supply assures the district a total of 685 cu. ft. per sec. and 217,000 acre ft. annually for municipal and power purposes. Fabrication of the electrically welded pipe line, for which 75,000 tons of plates is being used, is proceeding at the rate of over 1000 ft. a day.

Pig Iron.—Little of importance has developed during the week. Inquiry is mostly for small lots, and current orders are light. The total tonnage of foundry iron bought on the Pacific Coast so far this year is somewhat less than it was during the first six months of last year. Prices are unchanged.

*Utah basic.....	\$26.00 to \$27.00
*Utah foundry, sil. 2.75 to 3.25....	26.00 to 27.00
**English foundry, sil. 2.75 to 3.25....	25.00
**Indian foundry, sil. 2.75 to 3.25....	25.00
**German foundry, sil. 2.75 to 3.25....	23.00 to 23.50
**Dutch foundry, sil. 2.75 to 3.25....	22.50
**Belgium foundry, sil. 2.75 to 3.25....	22.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Shapes.—Fabricated lettings for the week total 2926 tons. No fresh inquiries of importance are known to have come up for figures. The largest individual award, 2000 tons for an apartment house in Beverly Hills, Cal., was placed with the Llewellyn Iron Works, Los Angeles. This is the largest letting that has been made in several weeks. Eastern mills continue to quote plain material at 2.30c. to 2.35c. c.i.f. Coast ports.

Plates.—The municipal pipe line for Tacoma, Wash., calling for 1500 tons has been awarded to the Steel Tank & Pipe Co. of Oregon, Portland. Specifications call for an electrically welded pipe line similar to that which is being fabricated by the Steel Tank & Pipe Co. of California for the Mokelumne River project. Bids will be taken June 21 on 1450 tons for a pipe line for

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes.....	3.30c.
Mild steel bars and small angles.....	3.30c.
Small channels and tees, ½-in. to 2¼-in..	3.90c.
Spring steel, ¼-in. and thicker.....	6.30c.
No. 28 black sheets.....	4.75c.
No. 10 blue annealed sheets.....	3.75c.
No. 28 galvanized sheets.....	6.00c.
Common wire nails, base per keg.....	\$3.50
Cement coated nails, base per keg.....	3.00

the Lemon Grove & Spring Valley Irrigation District, La Mesa, Cal. An Eastern mill which has been quoting 2.25c., c.i.f. Coast ports, is now quoting 2.30c., and most of the disposition, lately shown, to shade prices seems to have abated. A quotation of 2.20c. is understood to have been made earlier in the week, but it is not known to have been repeated. There is undoubtedly a firmer price tone today than there has been in several weeks. Most of the Eastern mills are now quoting 2.30c., c.i.f., and 2.35c. on small tonnages.

Bars.—Lettings of reinforcing bars during the week total 1738 tons, the largest individual award, 800 tons, for warehouse additions for Montgomery, Ward & Co., Oakland, Cal., was placed with a San Francisco jobber. This same jobber also took 600 tons for a local municipal railway tunnel on Duboce Avenue. Fresh inquiry is limited, as the local carpenters' strike continues to have a retarding effect upon building operations. Local reinforcing bar jobbers quote as follows: 2.80c. base per lb. on lots of 250 tons; 2.95c. base per lb. on carload lots, and 3.20c. base on less than carload lots.

Bolts and Rivets.—The Southern Pacific Equipment Co., San Francisco, has placed about 70 tons of carriage bolts with Eastern and Pacific Coast producers. The Steel Tank & Pipe Co., Berkeley, Cal., has placed 230 tons of rivets with an Eastern mill.

Warehouse Business.—Buying is confined to small lots, and jobbers say that their customers are not anticipating forward requirements except in a few instances. Prices are unchanged.

Cast Iron Pipe.—Few public lettings have been made. The city of Alhambra, Cal., has awarded 130 tons of 4, 6, and 18-in. Class B pipe to B. Nicoll & Co., and the city of Eureka, Cal., has placed about 37 tons of "mono-cast" pipe with the American Cast Iron Pipe Co. The city of Los Angeles is asking for bids on 293 tons under specification 795-C. Quotations are unchanged at \$50 to \$52 base, water shipment, San Francisco.

Steel Pipe.—The Pacific Gas & Electric Co., San Francisco, is inquiring for about 500 tons of 5 and 8-in. standard line pipe. Los Angeles has placed 263 tons of Matheson-joint steel pipe, required under specification 793-B, with the N. O. Nelson Mfg. Co., Los Angeles.

Coke.—The Southern Pacific Co. has placed 500 net tons of by-product coke with a local importer. Fresh shipments of German by-product are en route. Inquiry during the week was relatively light. German by-product coke is being quoted at about \$12 to \$12.50 per net ton at incoming dock.

St. Louis

Revival in Pig Iron Buying—Scrap Market Is Firmer

ST. LOUIS, June 22.—After a long period of lethargy, mills and foundries in this district have begun to cover their pig iron requirements. Sales of all descriptions of iron during the past week or ten days totaled close to 65,000 tons, which was considerably more than the aggregate of the preceding two months. Of this quantity the St. Louis Coke & Iron Co. disposed of about 55,000 tons, including 45,000 tons of basic for delivery to local steel makers through the remainder of this year. The foundry iron sold was generally distributed among all classes of users, with delivery specified from prompt to the end of 1926. The cut in Southern iron brought out some buying. Small tonnages of Northern iron were placed here at a price figuring back to \$20, Chicago.

We quote delivered consumers' yards, St. Louis as follows, having added to furnace prices, \$2.16 freight from Chicago, \$4.42 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25....	\$22.66 to \$23.16
Northern malleable, sil. 1.75 to 2.25.....	22.66 to 23.16
Basic.....	23.16 to 24.16
Southern fdy., sil. 1.75 to 2.25....	24.42 to 25.42
Granite City iron, sil. 1.75 to 2.25.....	22.81 to 23.31

Finished Iron and Steel.—While considerable construction work is in sight, new business placed with the fabricators and producers of building material was light, and mainly for small jobs. Warehousemen report the first half of June better than the same period last year, with materials for the rural districts moving particularly well. With the exception of galvanized material, sheet demand has bettered during the past

Warehouse Prices, f.o.b. St. Louis	
	Base per Lb.
Plates and structural shapes.....	3.25c.
Bars, mild steel or iron.....	3.15c.
Cold-finished rounds, shafting and screw stock.....	3.75c.
No. 28 black sheets.....	4.60c.
No. 10 blue annealed sheets.....	3.60c.
No. 28 galvanized sheets.....	5.70c.
Black corrugated sheets.....	4.65c.
Galvanized corrugated sheets.....	5.75c.
Structural rivets.....	3.65c.
Boiler rivets.....	3.85c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller.....	.70
Machine bolts.....	.50 and 5
Carriage bolts.....	.47 1/2
Lag screws.....	.55 and 5
Hot-pressed nuts, square, blank or tapped,.....	3.25c. off per lb.
Hot-pressed nuts, hexagons, blank or tapped,.....	3.75c. off per lb.

week. The leading producer of tin plate is booked through August. There is a good demand for tank plates from the Southern oil sections. Railroad buying has improved to some extent, but is still far from impressive.

Coke.—Contracting for distant requirements of metallurgical coke continues in fair volume, but current purchasing has dropped off, reflecting reduced melt at mills and foundries. Some improvement in the demand for industrial coke has developed, but the domestic trade is much depressed. Buying by dealers and householders to date is below the very low level of the corresponding period last year.

Old Material.—The market for scrap iron and steel is entirely a dealers' affair. Buying by these interests, either to lay down in yards or in hopes of profitable quick turns, is holding prices very firm. The industries, however, are still holding off. With the exception of 3000 tons of steel purchased by a local mill, consumer buying is on a hand-to-mouth basis. Yard stocks are lowest in a number of months. Railroads are still proffering freely, latest lists being: Missouri-Kansas-Texas, 800 tons; Louisville & Nashville, 11,000 tons; Rock Island, 6000 tons; International & Great Northern, 1600 tons, and Chesapeake & Ohio, 10,200 tons.

We quote dealers' prices f.o.b. consumers' works. St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails.....	\$11.00 to \$11.50
Rails for rolling.....	15.00 to 15.50
Steel rails less than 3 ft.....	15.50 to 16.00
Relaying rails, 60 lb. and under.....	24.00 to 25.00
Relaying rails, 70 lb. and over.....	30.00 to 31.00
Cast iron car wheels.....	15.50 to 16.00
Heavy melting steel.....	12.00 to 12.50
Heavy shoveling steel.....	12.00 to 12.50
Frogs, switches and guards cut apart.....	14.00 to 14.50
Railroad springs.....	16.00 to 16.50
Heavy axle and tire turnings.....	8.50 to 9.00
No. 1 locomotive tires.....	16.00 to 16.50
Per Net Ton	
Steel angle bars.....	11.50 to 12.00
Steel car axles.....	16.75 to 17.25
Iron car axles.....	20.50 to 21.00
Wrought iron bars and transoms.....	17.75 to 18.25
No. 1 railroad wrought.....	10.00 to 10.50
No. 2 railroad wrought.....	11.00 to 11.25
Cast iron borings.....	8.50 to 9.00
No. 1 busheling.....	9.25 to 9.75
No. 1 railroad cast.....	14.50 to 15.00
No. 1 machinery cast.....	16.50 to 17.00
Railroad malleable.....	13.00 to 13.50
Machine shop turnings.....	5.75 to 6.25
Bundled sheets.....	6.50 to 7.00

Freight cars moved 29 miles per day in April—the highest for any April on record—according to reports to the Bureau of Railway Economics. The average load per car in April was 26.2 tons, a slight increase over the two preceding April figures. This makes a movement of 760 ton-miles per car per day, against the 900 ton-miles goal of the railroads.

Boston

Active Competition for Pig Iron Business with Further Price Concessions

BOSTON, June 22.—Buffalo and Cleveland steel mills invaded the New England pig iron market the past week, and by cutting prices in competition with New York State and German iron, on which price concessions previously had been made, obtained sizable tonnages. Prices were so attractive that the General Fire Extinguisher Co., Providence, R. I., increased its inquiry from 1500 tons to 2000 tons, one-half No. 2X and one-half No. 1X. It is reported to have bought 1000 tons No. 1X German iron at less than \$22 a ton delivered in the yard, and have split the 1000 tons No. 2X three ways, a third going to a New York State furnace and the rest to the Buffalo and Cleveland steel mills on a delivered basis of less than \$23.50 a ton. The Buffalo steel mill is reported to have quoted prices equivalent to about \$18 on cars at furnace, the Cleveland mill at around \$17.50, while the other New York State furnace obtained more owing to a big advantage in freight rates. The H. B. Smith Co., Westfield, Mass., maker of heaters and radiators, is said to have bought approximately 10,000 tons of No. 2 plain from a New York State furnace at equally attractive prices, and the Sullivan Machinery Co., Clairmont, N. H., bought three grades of iron at comparatively low prices. These sales represent the largest made in this territory, but, in addition, the three active interests have picked up small orders, which in the aggregate amount to several thousand tons, practically all for third quarter and a little running into fourth quarter delivery. The Mystic Iron Works has taken additional trial lots at \$21 furnace base and some India No. 2X has been sold at \$22 on dock here duty paid, and No. 1X at \$22.50. It is reported the Cleveland mill will blow out a furnace after a certain tonnage of ore on hand has been consumed, and price therefore is a second consideration.

We quote delivered prices on the basis of the latest sales as follows, having added \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia, and \$9.60 from Alabama:	
East. Penn., sil. 1.75 to 2.25.....	\$24.15 to \$25.15
East. Penn., sil. 2.25 to 2.75.....	24.65 to 25.65
Buffalo, sil. 1.75 to 2.25.....	22.91 to 24.91
Buffalo, sil. 2.25 to 2.75.....	23.41 to 25.41
Virginia, sil. 1.75 to 2.25.....	27.92 to 29.92
Virginia, sil. 2.25 to 2.75.....	28.42 to 30.42
Alabama, sil. 1.75 to 2.25.....	30.60 to 31.60
Alabama, sil. 2.25 to 2.75.....	31.10 to 32.10

Shapes and Plates.—Buying of structural shapes has quieted down somewhat now that the largest consumers have covered third quarter requirements, and mills also report less doing in plates. The market on shapes is firm at 2c., Pittsburgh base, while plates are still obtainable at 1.90c. Fabricators report prospective business as rather flat, there being no jobs of consequence in the market. Small jobs are fairly plentiful, however, and in the aggregate run into a fair tonnage. Plans have been completed for a baseball cage at Harvard University, Cambridge Mass., which, according to report, will require several hundred tons of steel.

Warehouse Prices, f.o.b. Boston	
	Base per Lb.
Soft steel bars and small shapes.....	3.265c.
Flats, hot rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined.....	3.265c.
Best refined.....	4.60c.
Norway, rounds.....	6.60c.
Norway, square and flats.....	7.10c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees.....	3.365c.
Zees.....	3.465c.
Plates.....	3.365c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hexagons.....	3.95c.
Squares and flats.....	4.45c.
Toe calk steel.....	6.00c.

Cast Iron Pipe.—Wellesley, Mass., has awarded 300 tons of 10 in. to 14 in. pipe to the Warren Foundry & Pipe Co. Braintree, Mass., closed bids on June 14 for 350 tons of 12 in., 14 in. and 16 in. pipe, but has made no award. New London, Conn., closed bids June 17 on 600 tons of 12 in., but has held up the award. Winchendon, Mass., closed bids June 23 on 200 tons of 6 in. to 12 in. pipe. Prices on 12 in. pipe and smaller are strong, but on larger sizes concessions running as high as \$1 a ton have been offered recently. Prices quoted openly follow: 4 in., \$60.10 a ton, delivered common Boston freight rate points; 6 in. to 12 in., \$55.10 to \$56.10; larger pipe, \$54.10 to \$55.10. The usual \$5 differential is asked on Class A and gas pipe.

Coke.—Coke market conditions remain practically unchanged. The New England Coal & Coke Co. and the Providence Gas Co. still are making shipments against first half contract specifications on a basis of \$12 a ton, delivered within a \$3.10 freight rate zone, for standard by-product fuel. The Connellsville district coke is offered at delivered prices \$2 a ton lower, but securing comparatively little business in New England. Deliveries by New England ovens are still under those for the corresponding period last month, but about on a par with those for June, 1925.

Old Material.—The movement of old material out of New England the past week possibly was a little freer, but any increase was hardly perceptible. Brokers have plenty of orders, but are unable to complete them owing to the fact that little material is coming out at prevailing prices. Activity centers largely in heavy melting steel, pipe, machine shop turnings, rolling mill borings, mixed borings and turnings and such material as forged scrap and skeleton. Individual purchases, however, are confined to car lots here and there. The spread between shafting and street car axle prices appears wider than usual owing to an effort to complete an order for axles for eastern Pennsylvania delivery. General sentiment in the old material trade is better than it has been in several weeks, the feeling being that the low point in prices has been reached.

The following prices are for gross-ton lots delivered consuming points:

Textile cast	\$19.50 to \$20.00
No. 1 machinery cast	19.00 to 19.50
No. 2 machinery cast	17.00 to 18.00
Stove plate	13.00 to 13.50
Railroad malleable	18.50 to 19.00

The following prices are offered per gross-ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$10.00 to \$10.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 yard wrought	12.00 to 12.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	9.00 to 9.50
Machine shop turnings	8.00 to 8.50
Cast iron borings, chemical	10.00 to 10.50
Cast iron borings, rolling mill	8.00 to 8.50
Blast furnace borings and turnings	8.00 to 8.50
Forged scrap	8.00 to 8.50
Bundled skeleton, long	8.00 to 8.50
Forged flashings	8.00 to 8.50
Bundled cotton ties, long	8.25 to 8.50
Bundled cotton ties, short	8.50 to 9.00
Shafting	15.00 to 15.50
Street car axles	16.50 to 17.50
Rails for rerolling	11.00 to 11.50
Scrap rails	10.00 to 10.50

Cincinnati Iron Molders Refuse 25 Cent Advance

CINCINNATI, June 21.—Local union iron molders, on strike since June 1, have declined to accept an offer from foundry owners to increase their wages 25c. a day. The offer was made following the rejection by the employers of the proposal of the strikers for an increase of 50c. a day. The wage agreement which expired on May 31 called for \$7 a day, but the molders demanded \$8. The foundry owners refused to grant the increase and the union men failed to report for duty on June 1.

The Bureau of Construction and Repair, Navy Department, Washington, will open bids on July 6 for 1490 tons of special treatment plates for submarines V-5 and V-6. Quotations are asked on the basis of delivery both at the Portsmouth, N. H., and Mare Island, Cal., navy yards.

Buffalo

Increased Inquiry for Pig Iron—Sheets Notably Active

BUFFALO, June 22.—The total inquiry for the week is about 10,000 tons, but sellers believe that a much larger amount is about to come out. An Eastern consumer wants 2000 to 3000 tons of foundry, a New England inquiry is for 1200 tons of foundry, another buyer wants 1000 tons, and one or two for 200 to 300 tons of foundry and one or two for 200 to 400 tons of foundry have appeared. One inquiry from Canada is for 300 tons of malleable. The price appears firm at \$20 for No. 2 plain, \$20.50 for No. 2X and \$21.50 for No. 1X, but a base of \$18 and \$19 has been named in competitive territory. Basic is held at \$19. The price of charcoal iron is still \$29.28.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

No. 2 plain fdy., sil. 1.75 to \$2.25	\$19.00 to \$20.00
No. 2X foundry, sil. 2.25 to 2.75	19.50 to 20.50
No. 1X foundry, sil. 2.75 to 3.25	20.50 to 21.50
Malleable, sil. up to 2.25	20.00
Basic	19.00
Lake Superior charcoal	29.28

Finished Iron and Steel.—Sheets are particularly active this week, and a local mill reports that they are sold further ahead than at any time for the past two years. There is a very heavy rush for material on the score that prices are inclined to strengthen. The black sheet price is 3.15c., Pittsburgh, with reports of shading on heavy gages. Steel bars are strong. In the structural line a local fabricator has a 30-ton job for a Y. M. C. A. at Lockport, N. Y., and a 500-ton job for a cement mill is due for award any day. Bolt and nut business is good, with third quarter contracts being made on the same basis as second quarter, 50 and 10 and 10 per cent off for cut thread machine bolts. Pipe is holding as usual, with specifications good and no change in prices.

Old Material.—The market is about the same as last week, except that the sentiment is much improved. There has been little buying to cause any price changes except that stove plate has strengthened somewhat under the impetus of purchasing by two consumers. This price is now \$15. One of the largest consumers of scrap material in the district states that it is pretty well covered for the time being, but this mill has been taking some machine shop turnings at \$10 to \$10.25. One of the incidents that has stirred the local market is the recent purchase by a Cleveland interest of 15,000 tons of machine shop turnings at \$11, Cleveland. Most of the buying activity now is confined to dealers.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$14.50 to \$14.75
Selected No. 1 heavy melting steel	15.50 to 15.75
Low phosphorus	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
Car wheels	17.00 to 17.50
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings	11.50 to 12.00
Cast iron borings	11.50 to 12.00
No. 1 busheling	14.50 to 14.75
Stove plate	15.00
Grate bars	13.00 to 13.50
Hand-bundled sheets	10.00 to 10.50
Hydraulic compressed	14.50 to 14.75
No. 1 machinery cast	16.00 to 16.25
Railroad malleable	16.50 to 17.00
Iron axles	24.00 to 25.00
Steel axles	16.00 to 16.50
Drop forge flashings	12.75 to 13.25

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Mild steel bars	3.30c.
Cold-finished shapes	4.45c.
Rounds	3.95c.
No. 28 black sheets	4.45c.
No. 10 blue annealed sheets	3.80c.
No. 28 galvanized sheets	5.60c.
Common wire nails, base per keg	\$3.90
Black wire, base per 100 lb.	3.90

Birmingham

Cincinnati

Look for Early Good Pig Iron Demand—
Steel Mills at Capacity

Sales of 160,000 Tons of Pig Iron in Two
Weeks and Prices Strengthen

BIRMINGHAM, June 22.—Sales of pig iron in this district are showing a little life and indications are that a healthy buying movement is not far off. The new price base, \$21 per ton for No. 2 foundry, is being maintained in this district. The larger consumers have not come into the market on their probable needs but indications are that these will be large. A little spot iron, a few hundred tons daily, is heard of and furnace companies are asking \$22 per ton on this. Plans call for continued operation of 14 blast furnaces on foundry iron, 10 on basic and one on ferromanganese. Surplus iron is slowly being worked down, there being no addition this month to the foundry iron piles. The Sloss-Sheffield Steel & Iron Co. does not expect to have its No. 4 blast furnace at North Birmingham, now being relined and repaired, back in operation until about July 15. This company has five blast furnaces on foundry iron, and has begun the erection of new furnaces to replace its pair of city furnaces; the first will be ready for operation early next year. Larger melters of iron have intimated that 50 cents to \$1 per ton concession is looked for.

We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 2 foundry, 1.75 to 2.25 sil...	\$21.00 to \$22.00
No. 1 foundry, 2.25 to 2.75 sil...	21.50 to 22.50
Basic	21.00 to 22.00
Charcoal, warm blast	30.00

Rolled Steel.—With very few exceptions, steel mills, fabricating shops and structural steel works are going to capacity. Recent readjustment of prices on some shapes has not disturbed activity. The smaller fabricating shops on structural shapes are still busy and proprietors see no cessation for some time to come. The Ensley mills of the Tennessee Coal, Iron & Railroad Co. are shipping rails to Japan, moving down the Warrior River by barge to catch boats for Japan at Mobile and New Orleans. Soft steel bars are quoted 2.15c. to 2.25c., Birmingham, base; tank plates, 2.05c. to 2.15c.; structural shapes, 2.05c. to 2.15c.

Cast Iron Pipe.—Pressure pipe shops are operating at capacity and shipping as quickly as the pipe is tested. Lettings are still in sight and already business is in sight to warrant full make through the third quarter of year. The new centrifugal shop of the American Cast Iron Pipe Co. is completed and the McWane Cast Iron Pipe Co. has an increased output. Quotations are given at \$40 to \$41 on 6-in. and larger pipe. Shipment estimates are that the pipe production this year will be record for Alabama.

Coke.—No cessation of operations has taken place, with steady shipments outside of the territory as well as active consumption at home. Quotations of coke still range from \$5.50 to \$6 for foundry product, according to contract, quantity and time of delivery. Output is keeping pace with that which obtained during the entire first half of the year. Bee-hive ovens in operation are disposing of coke also.

Old Material.—Scrap prices have undergone readjustment and with few exceptions reductions from 50c. to \$1 per ton have been made. Very little old material is being purchased, No. 1 cast being the most active of the entire list. Even at \$12 per ton, heavy melting steel is finding a slow demand. Larger consumers are holding aloof until the greater portion of their previous purchases has been melted down. Dealers in old material are prepared for big demands.

We quote per gross ton, f.o.b. Birmingham district yards, as follows:

Cast iron borings, chemical.....	\$15.00 to \$16.00
Heavy melting steel.....	12.00 to 13.00
Railroad wrought	12.00 to 13.00
Steel axles	17.00 to 18.00
Iron axles	17.00 to 18.00
Steel rails	13.00 to 14.00
No. 1 cast	16.50 to 17.00
Tramcar wheels	16.00 to 17.00
Car wheels	16.00 to 16.50
Stove plate	14.00 to 14.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.50 to 8.00
Rails for rolling	15.00 to 16.00

CINCINNATI, June 22.—A steel company in the southern Ohio district has purchased approximately 60,000 tons of basic iron for fourth quarter delivery. It is understood that the price was 50c. to \$1 a ton higher than that paid a week ago by the same company for upward of 40,000 tons for third quarter delivery. Considerable iron has been sold under cover by local dealers, and it is estimated that about 160,000 tons have been bought by consumers in this market in the past two weeks. This constitutes the largest buying movement locally since November, 1924. Furnaces in the Ironton district booked considerable tonnage at \$19, base furnace, and in the last few days have quoted \$19.50. However, rather than have old customers place their orders with Lake furnaces, which still are selling foundry iron at \$18, base furnace, southern Ohio producers, it is claimed, would accept business at \$19. The large tonnage of basic iron bought a week ago by a steel plant nearby is reported to have gone to a Cleveland seller at a low price. Recent reductions in Alabama iron have stimulated sales somewhat, but furnaces in that State are not able to secure much sizable business north of the Ohio River at \$20.50 to \$21, base Birmingham. Small lots of Tennessee iron have been taken by melters in this territory, and the price is firm at \$21, base Birmingham. Jackson County silvery iron furnaces are booking a moderate number of small orders. No change has been made in the schedule, which calls for \$27.50 for 8 per cent. An Indiana consumer has closed for 6000 tons of foundry iron, dividing the tonnage between a Valley furnace and southern Ohio producers. A local dealer sold 1000 tons each to two melters, while a Louisville company purchased 750 tons of iron from Ironton sellers. Malleable iron is bringing \$18.50 to \$19, base furnace. This is a drop of 50c. a ton to meet the quotations made in this territory by Lake furnaces. The Andrews Steel Co. is inquiring for 500 tons of Bessemer iron. A local dealer has sold 650 tons of spiegeleisen in the past two weeks.

Based on freight rates of \$3.69 from Birmingham and \$1.89 from Ironton, we quote f.o.b. Cincinnati:

Alabama fdy., sil. 1.75 to 2.25	
(base)	\$24.19 to \$24.69
Alabama fdy., sil. 2.25 to 2.75...	24.69 to 25.19
Tennessee fdy., sil. 1.75 to 2.25...	24.69
Southern Ohio silvery, 8 per cent	30.39
So. Ohio fdy., sil. 1.75 to 2.25...	20.89 to 21.39
So. Ohio malleable.....	20.39 to 21.89

Finished Material.—Bookings in the past week have been liberal in volume, and several local selling offices report specifications and orders in the first 20 days of June equal to those in the entire month of May. Especially encouraging is the number of fresh structural projects which probably will be awarded in the near future. While buyers are satisfied to limit their purchases to immediate requirements, sales in the aggregate indicate that consuming industries are operating at a good rate. Producers of bars, structural

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes....	3.40c.
Bars, mild steel or iron.....	3.30c.
Reinforcing bars	3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel.....	4.75c. to 5.00c.
No. 28 black sheets	4.10c. to 4.30c.
No. 10 blue annealed sheets.....	3.60c.
No. 28 galvanized sheets	5.25c. to 5.40c.
Structural rivets	3.75c.
Small rivets.....	.65 per cent off list
No. 9 annealed wire, per 100 lb.....	\$3.00
Common wire nails, base per keg.....	2.95
Cement coated nails, base per 100-lb. keg.	3.15
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap welded steel boiler tubes, 2-in.....	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.....	19.00
4-in.	39.00

shapes and plates are exerting considerable effort to establish the new prices on those commodities on a firm basis. However, since the advance applies only to third quarter business and little tonnage for that delivery has been placed, the strength of the new schedule is yet to be tested. On the other hand, sheet mills are attempting to check the downward trend of prices, which now are at the lowest point of the year. The desire of independent producers to secure attractive tonnages has resulted in severe competition, and black sheets have fallen to 3.05c. to 3.15c., base Pittsburgh. With the fall roofing season not far distant, mills are trying to stabilize galvanized sheets for third quarter delivery at 4.30c., base Pittsburgh, but 4.25c. is being done on sizable lots. Blue annealed sheets are holding fairly firm at 2.30c., base Pittsburgh. Sales of bars have been moderate, and the market is steady at 2c., base Pittsburgh. Structural shapes are quoted at 2c., base Pittsburgh, for forward delivery, but mills are accepting business at 1.90c. for prompt shipment. Tank plates remain at 1.90c., base Pittsburgh. The demand for wire goods has been active. Common wire nails are selling at \$2.65 per keg, Ironton, and plain wire at \$2.50 per 100 lb., base Ironton.

Reinforcing Bars.—The Jones & Laughlin Steel Corporation has been awarded 350 tons of bars for the City Hall, Columbus, Ohio. Bids have gone in on 1500 tons for the experimental station at Wilbur Wright Flying Field at Dayton, Ohio. Otherwise, the market is quiet, and fresh projects are scarce. New billet bars are bringing 2c., Cleveland, and rail steel bars 1.90c., mill.

Warehouse Business.—Sales increased substantially in the past week. The improvement particularly is reflected in bars and structural steel. Quotations remain unchanged.

Old Material.—There has been an increase of \$1 a ton in heavy melting steel and of 50c. on a number of other items, principally various grades of rails. Railroad offerings in the past week brought out good prices. Considerable tonnage was purchased by local dealers. The mill situation, however, is not considered favorable. One plant is holding up shipments until July 1. Another is operating only at a fair rate, and is piling the material received on contract.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton

Heavy melting steel.....	\$12.00 to \$12.50
Scrap rails for melting.....	12.00 to 12.50
Short rails	17.00 to 17.50
Relaying rails	27.00 to 27.50
Rails for rolling.....	13.50 to 14.00
Old car wheels	12.50 to 13.00
No. 1 locomotive tires	16.50 to 17.00
Railroad malleable	15.00 to 15.50
Agricultural malleable	14.00 to 14.50
Loose sheet clippings	6.50 to 7.00
Champion bundled sheets	8.50 to 9.00

Per Net Ton

Cast iron borings	6.50 to 7.00
Machine shop turnings	6.00 to 6.50
No. 1 machinery cast	17.00 to 18.00
No. 1 railroad cast.....	14.00 to 14.50
Iron axles	20.00 to 20.50
No. 1 railroad wrought.....	9.00 to 9.50
Pipes and flues.....	7.50 to 8.00
No. 1 busheling.....	9.00 to 9.50
Mixed busheling	7.00 to 7.50
Burnt cast	7.00 to 7.50
Stove plate	8.50 to 9.00
Brake shoes	9.00 to 9.50

Coke.—It is understood that a by-product coke company in the southern Ohio district will continue during July its present price of \$7.50, ovens, or \$9.64 delivered Cincinnati, on foundry grades. Whether other producers will meet that quotation is not known. At present they are holding to \$8, ovens, but there has been some discussion of a 50c. decrease on July 1. Beehive foundry coke from the Wise County district has advanced 25c. a ton, and now is quoted at \$7.09, delivered here. A local dealer has sold 2400 tons of Wise County foundry for last half delivery. The Procter & Gamble Co., Cincinnati, is expected to purchase 6000 tons of furnace coke for its local plants. The Louisville &

Nashville Railroad is in the market for 705 tons of foundry coke.

Based on freight rates of \$2.14 from Ashland, Ky., \$3.53 from Connellsville, and \$2.59 from Wise County ovens and New River ovens, we quote f.o.b. Cincinnati: Connellsville foundry, \$7.53 to \$9.53; Wise County foundry, \$7.09; New River foundry, \$9.59 to \$10.09; by-product foundry, \$9.64 to \$10.14.

Improvement in Canadian Old Material

TORONTO, June 21.—The slight improvement that featured the Canadian iron and steel scrap market a couple of weeks ago continues to hold. Melters continue to show interest in their needs and small tonnage spot buying is reported on a more extensive scale than for some months past. While present demand is better than formerly, it is still much below normal, and in so far as foundries are concerned, is only about 50 per cent of capacity consumption. Mills and other large consumers in the Hamilton, Ont., district are buying more freely and according to local dealers fairly large shipments of old material are being made into this district. Improved demand is reported in heavy melting steel and turnings, but with the exception of machinery cast, the majority of other lines of scrap are spotty. In the Montreal market there has also been slight improvement in scrap sales both on export account and for home consumption. The stronger demand of the past couple of weeks has not stimulated trading between dealers, but on the contrary the majority of dealers are buying only when special lines of scrap are required, although it is stated that most yards are sufficiently well stocked for all present needs. While there has been no change in prices during the week, those listed appear somewhat firmer.

Canadian dealers' buying prices are as follows:

Per Gross Ton

	Toronto	Montreal
Steel turnings	\$9.50	\$6.50
Machine shop turnings.....	9.50	6.50
Wrought pipe	6.50	6.00
Rails	11.00	8.50
No. 1 wrought scrap.....	11.00	13.00
Heavy meltings steel.....	10.50	8.00
Steel axles	16.00	17.00
Axles, wrought iron.....	17.00	19.00

Per Net Ton

Standard car wheels.....	16.00	16.00
Malleable scrap	13.00	12.00
Stove plate	11.00	12.00
No. 1 machinery cast.....	16.00	18.00

Improved Business and Better Operations in the Valleys

YOUNGSTOWN, June 22.—Independent steel makers in the Mahoning Valley are being enabled, by reason of improving business, to schedule plants several weeks in advance in certain departments, and are building up moderate backlogs in some of the lighter materials.

Steel ingot production this week in the Valleys is at a 75 per cent rate. The general average of rolling mills operations is 70 per cent, comparing with 60 per cent a year ago. The Carnegie Steel Co. this week pushed production 6 to 7 per cent higher at its Youngstown district plants.

Steel pipe output averages 85 per cent. Of the 68 Corporation and independent open-hearth furnaces in the district, 49 will make steel. All Bessemer plants are in action, but not at a capacity rate. Of the 127 sheet and jobbing mills in the district, 104 are under power this week.

R. B. Wick, representing a bondholders' protective committee, last week purchased at auction sale in Warren, Ohio, the assets of the Warren Iron & Steel Co., which has been in receivership for two years. The purchase price of \$350,000 included the plant at Warren and coal holdings in Kentucky. There are \$400,000 of bonds outstanding. J. C. Manternach, president of the American Welding & Mfg. Co., Warren, served as receiver. The company was a maker of castings and agricultural steel implements.

NON-FERROUS METAL MARKETS

The Week's Prices		June 16	June 17	June 18	June 19	June 21	June 22
Cents per Pound for Early Delivery	Lake copper, New York.....	14.00	14.00	14.00	14.00	14.00	14.00
	Electrolytic copper, N. Y.*..	13.75	13.75	13.70	13.70	13.70	13.70
	Straits tin, spot, New York..	61.12½	61.37½	61.50	...	61.25	61.37½
	Lead, New York.....	8.35	8.35	8.35	8.35	8.35	8.35
	Lead, St. Louis.....	8.10	8.10	8.10	8.10	8.10	8.10
	Zinc, New York.....	7.55	7.50	7.47½	7.47½	7.47½	7.47½
	Zinc, St. Louis.....	7.20	7.15	7.12½	7.12½	7.12½	7.12½

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, June 22.—Following fairly heavy purchases in the first and second weeks of the month, the non-ferrous metals have lapsed into relative inactivity, consumers having satisfied their demands for the near future, and producers of copper, lead and zinc are not urgent sellers, as they have fairly good tonnage on their books.

Copper.—With most producers of copper, the business of the month will be approximately equal to their production. Consumers are a bit slower now to come into the market, and there is the first sign of price weakness in some time. Nominally, electrolytic copper is quotable at 13.75c. per lb., f.o.b. refinery, or 14c., delivered in the Connecticut Valley, but this has been shaded during the week to 13.95c., delivered. The export demand has been good, mostly for shipment to Germany, and the ruling price has been 13.90c. per lb., f.a.s. New York.

Tin.—Sales of tin in the past week have been fairly large, about 1200 tons changing hands. Consumers bought very little, most of the tin being taken by dealers, who presumably were covering short sales. The strongest demand was for July-August delivery, but a little was sold for June and September. At the end of last week some who had tin in stock showed a disposition to sell and realize the profits to be had by so doing. Paralysis of English industry has not materially affected the market here, and there is no indication that any great amount of tin has been diverted to this country that otherwise would go to England. The assumption is that English buyers are taking their scheduled shipments and putting them in storage pending a resumption of normal manufacturing activity.

Receipts at Atlantic ports so far this month have been 5775 tons and at Pacific ports 95 tons, with 2105 tons afloat that is due to arrive this month. This is not an unusual amount to come in considering the rate at which tin is being consumed. Prices stayed a fraction above 61c. per lb. throughout the week. The London price today for spot standard was £271, while future standard sold for £270 10s., spot Straits for £280 10s., and the Singapore price was £277.

Lead.—A buying wave in lead which carried prices from 7.65c. per lb., New York, to 8.25c. and higher within about 10 days has been followed naturally by a reaction amounting almost to dullness. However, lead producers took all of the business they wanted and could have had more. The leading interest made four advances in prices in an effort to check buying, as its policy is not to sell beyond its current production. The latest advance to 8.25c., New York, on June 16 remains the official price of that company, but in the outside market lead is fetching as high as 8.30c. and 8.35c. The buying movement started on June 8 and ended almost abruptly last Friday. During that time large tonnages were contracted for. Some consumers who could not be induced to buy beyond day-to-day requirements when the price was 7.65c. were insistent that their orders for substantial amounts be taken when the price had reached higher levels. Even at 8.25c. a good bit of business was booked. In contrast to the upward movement of prices here the British price has declined. On June 16, the day when the 8.25c. quotation was established here, the London price began to drop and up to today there had been a decline on both spot and future lead of £1 10s. per gross ton. In recent weeks the American market has been influenced considerably by the British market, and this may be so again, particularly if the difference in prices results in larger imports, today's British price being about 1c. per lb. under the American price at New York, duty paid.

Metals from New York Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	63.00c. to 64.00c.
Tin, bar	66.00c. to 67.00c.
Copper, Lake	15.25c.
Copper, electrolytic	15.00c.
Copper, casting	14.75c.
Zinc, slab	8.00c. to 8.50c.
Lead, American pig.....	8.75c. to 9.25c.
Lead, bar	11.00c. to 12.00c.
Antimony, Asiatic	12.00c. to 13.00c.
Aluminum, No. 1 ingot for remelting (guaranteed over 99 per cent pure) ..	30.00c. to 30.50c.
Babbitt metal, commercial grade ..	30.00c. to 35.00c.
Solder, ½ and ½ guaranteed.....	39.00c.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	67.25c.
Tin, bar	69.25c.
Copper, Lake	15.00c.
Copper, electrolytic	15.00c.
Copper, casting	14.00c.
Zinc, slab	8.40c.
Lead, American pig.....	8.90c.
Antimony, Asiatic	16.50c.
Lead, bar	11.00c.
Babbitt metal, medium grade.....	22.00c.
Babbitt metal, high grade.....	72.50c.
Solder, 50-50	40.75c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

Sheets—	
High brass	18½c. to 19½c.
Copper, hot rolled	22½c. to 23½c.
Copper, cold rolled, 14 oz. and heavier, ..	24½c. to 25½c.
Seamless Tubes—	
Brass	23½c. to 24½c.
Copper	24½c. to 25½c.
Brazed Brass Tubes	26½c. to 27½c.
Brass Rods	16½c. to 17½c.

From New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	12.75c.
Zinc sheets, open	13.25c.

Non-Ferrous Rolled Products

Mill prices in brass, bronze and copper products are unchanged. Lead full sheets were advanced June 17, ½c. to ¾c. per lb. to 12.00c. and 12.25c., while zinc sheets have remained unchanged since May 1.

List Prices Per Lb. f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. Per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	18.87½c.
Copper, hot rolled	22.50c.
Zinc	11.25c.
Lead (full sheets).....	12.00c. to 12.25c.
Seamless Tubes—	
High brass	23.50c.
Copper	24.25c.
Rods—	
High brass	16.62½c.
Naval brass	19.37½c.
Wire—	
Copper	15.87½c.
High brass	19.37½c.
Copper in Rolls	21.37½c.
Brazed Brass Tubing	26.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of the Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide....	37.50c.
Tubes, base	48.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	18 3/4 c. to 19 3/4 c.
Copper, hot rolled	22 1/2 c.
Copper, cold rolled, 14 oz. and heavier ..	24 3/4 c.
Zinc	12.00c.
Lead, wide	11.08c.
Seamless Tubes—	
Brass	23 1/2 c. to 25c.
Copper	24 1/4 c. to 25 3/4 c.
Braced Brass Tubes	26 3/4 c. to 29 1/4 c.
Brass Rods	16 3/4 c.

Zinc.—A galvanizer who bought 300 tons of zinc in the latter part of last week paid 7.10c., St. Louis, which is a shade under the price at which smaller tonnages have been going. There was a fair business last Friday at 7.12 1/2 c., St. Louis, but there has not been much done since.

Nickel.—Prices are unchanged, with ingot nickel in wholesale lots quoted at 35c. per lb. and shot nickel at 36c. Electrolytic nickel is to be had at 39c.

Antimony.—Prices for spot delivery have strengthened, today's quotation being 13c., New York, duty paid, while for July-August shipment the usual quotation is 12c. Consumers are not buying, but a fair business has been done with dealers.

Aluminum.—Virgin metal, 99 per cent plus, is quoted at 28c. per lb. and 98-99 per cent at 27c.

CHICAGO, June 22.—This market is more active and prices, with the exception of copper, have advanced.

REINFORCING STEEL**Awards of More Than 4000 Tons and New Projects Involve 5575 Tons**

Including 1300 tons for a Chicago apartment building, the week's awards of concrete reinforcing bars were upward of 4000 tons. Inquiries total 5575 tons, among which there are three jobs of good size—1200 tons for a warehouse in New York, 1500 tons for an experimental station at Wilbur Wright Flying Field, Dayton, Ohio, and 1800 tons for New York subway construction. Awards follow:

WORCESTER, MASS., 250 tons, Whittall Associates plant addition, placed by E. J. Cross, general contractor, with Joseph T. Ryerson & Son.
 BOSTON, ALLSTON DISTRICT, 250 tons, Mack Motor Truck Co. plant, to Barker Steel Co.
 WILLIAMSBURG, BROOKLYN, 100 tons, building for Union Gas Co., to Igoo Brothers.
 COLUMBUS, OHIO, 350 tons, City Hall, to Jones & Laughlin Steel Corporation.
 CHICAGO, 135 tons rail steel, apartment building, 426 Briar Place, to Calumet Steel Co.
 CHICAGO, 1300 tons, Carlson Apartment, Sheridan Road and Grace Street, to American System of Reinforcing.
 SANDPOINT, IDAHO, 163 tons, State bridge across Pend d'Oreille River near Newport, Wash., to unnamed firm through Sam Bondrye, general contractor, Lewiston, Idaho.
 SAN FRANCISCO, 600 tons, Sunset Tunnel, Duboce Avenue, to unnamed local jobber.
 SAN FRANCISCO, 175 tons, garage addition, Otis Street, to Badt-Falk Co.
 OAKLAND, CAL., 800 tons, warehouse addition for Montgomery Ward & Co., East Fourteenth Street, to unnamed San Francisco jobber.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

WALPOLE, MASS., 100 tons, warehouse, Lewis Mfg. Co.
 BOSTON, 100 tons, warehouse addition, Goodyear Tire & Rubber Co.
 NEW YORK, 1200 tons, warehouse, Varick and Charlton Streets; general contract to White Construction Co.
 NEW YORK, 1800 tons, subway construction work.
 DAYTON, OHIO, 1500 tons, experimental station for Wilbur Wright Flying Field; bids in.
 CLEVELAND, 125 tons, Auditorium Hotel.
 MANSFIELD, OHIO, 100 tons, Westinghouse Electric Products Co., factory building.
 FAIRPORT HARBOR, OHIO, 150 tons, building for P. C. Tomson Mfg. Co.

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators, and the selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	11.75c.	13.25c.
Copper, heavy and wire	11.25c.	12.25c.
Copper, light and bottoms	9.75c.	11.00c.
Brass, heavy	7.25c.	8.75c.
Brass, light	6.25c.	7.75c.
Heavy machine composition	8.75c.	10.00c.
No. 1 yellow brass turnings	8.25c.	9.00c.
No. 1 red brass or composition turnings	8.00c.	9.00c.
Lead, heavy	7.25c.	7.50c.
Lead, tea	5.50c.	6.25c.
Zinc	4.25c.	4.75c.
Sheet aluminum	17.00c.	19.00c.
Cast aluminum	17.00c.	19.00c.

Copper is easier and the demand has slackened. Lead, after several sharp upward turns to 9c. early in the week, has softened. Old metals, which were in brisk demand early in the week, have quieted down and prices are unchanged. We quote, in carload lots, Lake copper, 14.12 1/2 c.; tin, 62.50c.; lead, 8.60c.; zinc, 7.60c.; in less than carload lots, antimony, 13.50c. On old metals we quote copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 9.50c.; red brass, 9.25c.; yellow brass, 8c.; lead pipe, 7c.; zinc, 5c.; pewter, No. 1, 36c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 18c., all being dealers' prices for less than carload lots.

CHICAGO, 200 tons, five hospital buildings, United States Veterans' Bureau; general contractor, N. T. Severin.

CHICAGO, tonnage being estimated, mercantile building for Houghton-Mifflin & Co.; Gardner & Lindberg, engineers.

CHICAGO, tonnage being estimated, Park Lane Apartment, Sheridan Road and Surf Streets; Lowenberg & Lowenberg, architects.

CHICAGO, 100 tons, Joyce Brothers warehouse, 7411 Stoney Island Avenue; F. Stanton, architect.

CHICAGO, 200 tons, Medical Art Building; Thompson Starrett Co., general contractor.

Railroad Equipment Buying Below Expectations, Says W. H. Woodin

That the railroad buying of new equipment during the past year has not been in the volume that reasonably might have been expected is the statement of W. H. Woodin, president American Car & Foundry Co., New York, in making his annual report to stockholders. Railroad buying, he said, "has been done spasmodically and at prices that have made a profit possible only by keeping costs to a minimum." He goes on to say:

The railroads generally are in good financial condition. There is hanging over them no threat of legislation adversely affecting their interests. Undoubtedly there is need of additional equipment if they are to discharge adequately their functions as carriers of the products of the country's industry. These conditions justify the expectation of increased buying activity—and when that comes there is no reason to doubt that the company will get its fair share of the business.

There has been a very noticeable and progressive lessening of the volume of business done in the rebuilding and repairing of old equipment. This is due, in part, to a more or less insistent demand that the railroads should in their own shops rebuild and repair their worn equipment. Such demand is not justified on the score of cost. Your management has given this phase of the industry its earnest attention, and is convinced that the cost to the roads of themselves doing such work is substantially in excess of the cost of having it done in the shops and with the trained organizations of concerns such as your company. It is to be hoped that the roads will give to this subject the further thought and study its importance deserves.

The year's earnings have been sufficient for the payment of dividends on the capital stock of the company aggregating \$5,700,000—\$2,100,000 on the preferred and \$3,600,000 on the common—and for the transfer of \$400,000 to surplus. Reference is made in the report to the recent acquisition of a controlling interest in the Brill Corporation, which embraces plants for the manufacture of street cars and motor buses.

PERSONAL

Joseph Harrington has recently been elected president of a sales company to be known as the Joseph Harrington Co., a subsidiary of the Whiting Corporation, Harvey, Ill. The purpose of this new company is to market the "King Coal" stoker, which was designed by Mr. Harrington for small boilers of 40 to 250 rated hp. Mr. Harrington, a graduate of the Massachusetts Institute of Technology, was associated with the Green Engineering Co. from 1900 to 1912. From 1912 to 1917 he was engaged as a consulting combustion engineer, and during the war he was a member of the United States Fuel Administration for Illinois, in charge of the conservation of coal in the industrial power plants of that State. He is a member of the American Society of Mechanical Engineers, Engineers' Club of New York and an honorary member of the National Association of Stationary Engineers. Other officials of the new company are: Vice-presidents, Col. T. S. Hammond (president and treasurer of the Whiting Corporation), and R. M. Bournie; secretary-treasurer, R. A. Pascoe. Mr. Harrington has been retained by the Grindle Fuel Equipment Co., another Whiting subsidiary, to act as an advisory engineer in connection with the application of Grindle pulverized coal equipment to steam boilers.



JOSEPH HARRINGTON

H. B. Rose has been appointed district engineer for the Youngstown district, Youngstown Sheet & Tube Co. H. Ovesen is chief engineer.

Walter E. Forman has been appointed safety director of the General Fireproofing Co., succeeding William C. Simcox, resigned. Mr. Forman has been associated with this department for several years and also has supervision over raw materials.

Frank Transou has resigned from official connection with the Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co., to become superintendent for a contracting firm in Pittsburgh, engaged in building the Pittsburgh tubes. Mr. Transou has had wide experience as a shaft and tunnel superintendent and was in charge, at Nemacolin, Pa., of sinking an auxiliary air shaft put down to increase ventilation in the mine.

A. Milton Buck has joined the sales force of the Bridgeport Brass Co., Bridgeport, Conn. He will live in Washington, covering the District of Columbia, Maryland, Virginia and West Virginia, specializing on sales of Bridgeport-Keating flush valves and plumrite brass pipe.

Glen Treslar has been transferred from manager of the Buffalo office of the Van Dorn Electric Tool Co., Cleveland, to a similar capacity in the Chicago office. Mr. Treslar has been with the company for many years and knows much about electric drills, their manufacture and use.

William Hutton Blauvelt, consulting engineer, 120 Broadway, New York, sails July 3 on the Caledonia for Europe, where he plans to spend July and August. During this period he will investigate the work now being so intensively carried on in England, France and Ger-

many on problems relating to the carbonization and processing of coal. He will give especial attention to the new low-temperature and hydrogenation processes.

A. E. Hitchner, an executive of the East Pittsburgh headquarters of the Westinghouse Electric & Mfg. Co., has been promoted to the managership of the company's Los Angeles office, the post having been made vacant by the resignation of K. E. Van Kuran. Mr. Hitchner was a graduate in electrical engineering from Rutgers College, and before joining the Westinghouse company worked for the Baldwin Locomotive Works and the Link-Belt Co., Philadelphia.

Edward V. Peters, who for the past seven years has served as general sales manager of the New Jersey Zinc Co. and its subsidiary, the New Jersey Zinc Sales Co., has resigned with the intention of entering another line of business.

John V. W. Reynders, 120 Broadway, New York, who has been in Russia for several months in connection with the American-Caucasian manganese ore concession, expects to return to New York on July 2.

Delbert C. Davis and Charles L. Kenyon have been elected assistant treasurers of General Electric Co., Schenectady, N. Y. Mr. Davis, formerly with the Fort Wayne Electric Works, went to the General Electric Co. in 1909. Mr. Kenyon joined the company in March, 1924.

E. L. Becker, advertising manager Newport Rolling Mill Co., Newport, Ky., has been elected vice-president and a member of the board of directors of the Advertising Club of Cincinnati.

Edward W. Smith, who as announced in THE IRON AGE of June 17 has been appointed assistant general manager of sales of the Pittsburgh Steel Co., Pittsburgh, succeeding George W. Jones, who recently was promoted to general manager of sales, has been connected with the company since 1904. His first eight years were in conjunction with general office work in Pittsburgh, after which he went on the road as a fence salesman, later soliciting business from the jobbing and manufacturing trade. His ten years of work as a traveling salesman led to his appointment in 1922 as assistant manager of the company's Chicago office. In 1924 Mr. Smith was transferred to the main office in Pittsburgh as sales agent, in which capacity he served until his present appointment.



E. W. SMITH

James B. Armstrong, 303 Fifth Avenue, New York, has been appointed district representative for the Cape Ann Anchor & Forge Co., Gloucester, Mass., manufacturer of hammered forgings, both rough forged and rough turned. Mr. Armstrong represents also the Lebanon Drop Forge Co. and the Lebanon Steel Foundry.

Samuel E. Winslow, prominent Worcester, Mass., manufacturer, has been nominated by President Coolidge for a five-year term on the recently created board of mediation for the settlement of railroad labor disputes.

George Edwards, for the past six months in charge of the Buffalo works of the Peck, Stow & Wilcox Co.,

Southington, Conn., is to assume management of the works at the parent plant.

George T. Kimball, president American Hardware Co., C. W. Christ, vice-president and director, Stanley Works, and R. E. Pritchard, assistant treasurer, Stanley Works, all of New Britain, were the speakers at the first of a series of executive nights to be held by the Purchasing Agents' Association of Connecticut at the Shuttle Meadow Golf Club, New Britain, on Tuesday evening, June 22.

C. E. Bales, formerly assistant manager Louisville Fire Brick Works, has resigned and is now associated with the Ironton (Ohio) Fire Brick Co. in the capacity of production manager. Mr. Bales has made a special study of fire brick for malleable iron furnaces and has been actively interested in various organizations conducting research work on refractories. He is a member of the Refractories Committee, American Foundrymen's Association, and of the Research Advisory Committee, American Refractories Institute and last year was chairman of the Refractories Division, American Ceramic Society.

Charles Leslie Rice has recently been made works manager of the Hawthorne Works, Cicero, Ill., of the Western Electric Co. He succeeds Clarence G. Stoll, recently made general manager of manufacture in charge of all Western Electric factories in this country. Mr. Rice was born in Pittsfield, Mass., Aug. 5, 1879, and was educated at the Massachusetts Agricultural College and Boston University. He joined the Western Electric Co. in 1902. In 1911 he was made manager of the Western Electric factory in London, England and three years later became superintendent of production at the Hawthorne plant. In 1923 he was made assistant works manager. He recently was elected vice-president and director of the First National Bank of La Grange, Ill. He is a member of the Western Society of Engineers, the American Signal Corps Association and the La Grange Civic Club.

Milton M. Jones, treasurer Belle City Mfg. Co., Racine, Wis., manufacturer of threshing and other farm machinery, has resigned after an association with the concern lasting 38 years. He started as an office boy and 12 years ago was elected treasurer. Mr. Jones expects to spend six months or more in travel and recreation.

Thomas F. Howe, general sales manager Republic Rolling Mill Corporation, Chicago, is undergoing medical attention at Birmingham, Ala., following a nervous breakdown early in June. He is expected to return to Chicago within the next 30 days.

C. F. Loweth, chief engineer for the Chicago, Milwaukee & St. Paul Railway, has been given the honorary degree of doctor of engineering by Rose Polytechnic Institute, Terre Haute, Ind. He is a graduate of the University of Wisconsin and has been chief engineer for the St. Paul railroad since 1911.

Frank A. Scott, president Warner & Swasey Co., Cleveland, has been honored with the degree of doctor of laws by Western Reserve University, Cleveland. The degree was conferred upon him during the commencement exercises, June 17.

J. V. Emmons, metallurgist of the Cleveland Twist Drill Co., Cleveland, has been elected vice-president of the Cleveland Engineering Society.

E. D. Shaw, formerly of the Morse Rogers Steel Co., Cleveland, has become associated with H. V. Morse, dealer in sheets and strip steel and allied lines, 642 Rockefeller Building, Cleveland.

Maurice R. Hart has been appointed manager of the new Buffalo office of the Morse Chain Co., Ithaca, N. Y., and is located in the Ellicott Square Building.

Clifton Reeves and Staff, consulting and operating industrial engineers, have removed their New York offices from 150 Broadway to 341 Madison Avenue. The Detroit office is at 2-218 General Motors Building.

OBITUARY

URI T. HUNGERFORD, chairman of the board of directors of the widely-known New York brass and copper company bearing his name, died at his residence



URI T. HUNGERFORD

in New York on June 16, in his eighty-fifth year. He was born in Torrington, Conn., Dec. 14, 1841, from New England stock dating back to 1639. The name has been intimately associated with the brass industry in Connecticut, where his father, John Hungerford, in 1834, built the first brass mill in Torrington. Mr. Hungerford always maintained an active interest in the place of his birth and in 1917 presented to the town the Charlotte Hungerford Hospital, in memory of his mother. In 1855 he entered the West Point Military Academy, where he studied for two years, leaving there to begin his

business career in Philadelphia. In 1865 he became associated with Wallace & Sons, brass and copper rolling mills, Ansonia, Conn., acting as their New York representative and manager until 1895, when he established the U. T. Hungerford Brass & Copper Co. Mr. Hungerford had other extensive business interests, having been president of the Hungerford Securities Corporation and founder of the Hallenbeck-Hungerford Realty Corporation, and was largely interested in other companies in the brass and copper and allied industries.

EARL W. OGLEBAY, a pioneer in the Lake Superior iron ore industry, with which he was identified in Cleveland for over 40 years, died at his home in Cleveland on June 22, at the age of 78 years. He was born in Bridgeport, Ohio, and, after a college education, was employed by the National Bank of West Virginia at Wheeling, of which he became president at the age of 28, and of which he was the head for almost 50 years. As a banker he became interested in blast furnaces in Pittsburgh and Wheeling and later became interested in iron ore. In 1884 he went to Cleveland, where he became associated with a firm of ore merchants, and in 1890 organized the firm of Oglebay-Norton & Co., of which he was the active head until he retired a few years ago. Although he spent most of his time in Cleveland, up to his retirement, he retained his legal residence in Wheeling.

GEORGE T. HERBERT, aged 27, of the Bethlehem Engineering staff at the Cornwall Ore Mines, Cornwall, Pa., died at Lebanon, Pa., June 21, of appendicitis. He was a junior associate member of the American Institute of Mining and Metallurgical Engineers.

JOSEPH R. WILFONG, president Millard F. Wilfong Iron Works Co., Philadelphia, died June 14, at the home of a sister in Hagerstown, Md., at the age of 43. Mr. Wilfong several years ago succeeded his father, Millard F. Wilfong, as president of the company. Since the fire that seriously damaged the plant about six months ago, and the more recent decision not to resume operation of the works, Mr. Wilfong had not been in good health.

Few British Mills Quote For Future

Limited Operation on Foreign Fuel—Stocks Bring High Prices—Tin Plate Orders Come to United States—Pig Iron Rises

(By Cable)

LONDON, ENGLAND, June 21.

THE situation is growing worse with only six Cleveland furnaces in blast, of which four are producing hematite at Consett and two are on foundry at Southbank. Two furnaces are in blast in Scotland. Stocks of both foundry and forge iron are very low but hematite supplies seem to be adequate. Cleveland prices have been advanced still further. Foreign ore is dull and Bilbao Rubio prices are nominal.

A few steel plants are operating but makers are not inclined to sell for forward delivery except at increased prices. Some sheet and bar mills are running on foreign coal and endeavoring to execute current orders. The Stanton Ironworks Co., near Nottingham,

with an annual capacity of about 240,000 tons of pig iron, has suspended. The Canadian Pacific Steamship Co. has contracted for two liners of 18,000 tons each with John Brown Co. and William Beardmore & Co.

Stock tin plate demand is actively maintained, up to 23s. 6d. per base box, f.o.b., being paid. Forward business has been booked at 20s. 3d. per base box, f.o.b., but this business is diminishing.

On May 31 there were 177 tin plate mills in operation. Export buyers are placing orders in the United States and on the Continent. Galvanized sheets continue firm with stocks negligible and important makers not quoting. Other mills name October as the earliest delivery. Black sheets are quiet.

The Continental markets are quiet and little business is being transacted with British traders.

FRENCH PRICES STEADIER

Most Mills Well Booked—Pig Iron Advanced—Differentials on Rolled Products Increased

PARIS, FRANCE, June 4.—Most mills are fairly well provided with domestic business, and with the moderate volume of orders being booked no difficulty in maintaining operations through the summer is expected. Export prices, which have been rather weak, are showing a tendency to greater firmness and business continues in fair volume. The trade is in a more satisfactory position, following the recent violent fluctuations of exchange, which have temporarily subsided.

Pig Iron.—Production is well maintained and a good volume of inquiry continues. The recent advances in foundry iron are reported to have been made because of a belief by producers that foundrymen were buying for stock to protect themselves against the expected advance. Effective June 1, phosphoric foundry iron was advanced 40 fr. (\$1.11) per ton. No. 3 smooth skin foundry is now quoted at 460 fr. (\$12.80) per metric ton and No. 3 rough skin foundry at 450 fr. (\$12.50). The price, based on silicon content, is 456 fr. (\$12.70) per ton for 2.30 to 3.00 per cent Si, 465

fr. (\$12.95) for 3.00 to 4.00 per cent Si and 478 fr. (\$13.30) for 4.00 to 5.00 per cent Si. No. 3 foundry, f.o.b. Antwerp, is quoted at 66s. per ton (\$16.05).

Ferroalloys.—Spiegeleisen of 10 to 12 per cent Mn. has been increased 60 fr. (\$1.70) per ton to 785 fr. (\$21.85) for domestic consumers except in the South and the Saar. Spiegeleisen 18 to 20 per cent Mn. has been advanced by 72 fr. (\$2.00) per ton to 961 fr. (\$26.70).

Semi-Finished Material.—Domestic prices are high with billets in some instances quoted at 650 to 700 fr. (\$18.05 to \$19.45) per ton. Since the British strike began sizable tonnages of semi-finished material have been held ready for shipment to Britain as soon as resumption of British mills was possible. Continuation of the coal strike and the almost complete suspension of British mills is causing the impression to spread among exporters and Belgian mills that much of this material may eventually be forced onto the Belgian market, resulting in a serious depression in semi-finished prices. Billets are quoted at £4 3s. to £4 4s. (\$20.17 to \$20.41) per ton, and blooms at £3 17s. to £3 18s. (\$18.70 to \$18.95) per metric ton, f.o.b. Antwerp.

Finished Material.—Fluctuation of the exchange is still a deterrent to large business and although the exchange has in the past few days exhibited greater

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.86 per £ as follows:

Durham coke, del'd..	£0 18½s.	to £1 1¼s.	\$4.50
Bilbao Rubio ore†...	1 1	to 1 1¼	5.10 to 5.16
Cleveland No. 1 fdy...	4 2½ and 4 3*		20.05 and 20.17*
Cleveland No. 3 fdy...	4 0 and 4 0½*		19.44 and 19.56*
Cleveland No. 4 fdy...	3 13 and 3 13½*		17.73 and 17.85*
Cleveland No. 4 forge	3 18½ and 3 19*		19.07 and 19.20*
Cleveland basic (nom.)	3 15 and 3 15½*		18.23 and 18.35*
East Coast mixed...	3 18½		19.07
East Coast hematite...	3 16 to 3 16½		18.46 to 18.58
Ferromanganese	15 0		72.90
*Ferromanganese	14 0		68.04
Rails, 60 lb. and up...	6 15 to 7 5		32.80 to 35.24
Billets	6 0 to 7 10		29.16 to 36.45
Sheet and tin plate bars, Welsh	6 5		30.38
Tin plates, base box...	1 0 to 1 3½		4.86 to 5.71
Black sheets, Japanese specifications	13 10 to 14 0		65.60 to 68.04
Ship plates	7 5 to 7 15		1.57 to 1.68
Boiler plates	9 0 to 11 0		1.95 to 2.39
Tees	7 10 to 8 0		1.62 to 1.73
Channels	6 15 to 7 5		1.46 to 1.57
Beams	6 10 to 7 0		1.41 to 1.51
Round bars, ¾ to 3 in.	7 12½ to 8 2½		1.65 to 1.77
Steel hoops	10 10 and 11 0*		2.28 and 2.39*
Black sheets, 24 gage	10 15 to 11 0		2.33 to 2.39
Galv. sheets, 24 gage	16 5		3.52
Cold rolled steel strip, 20 gage	18 0		3.91

*Export price.

†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

Foundry pig iron:(a)	£3 7s.	to £3 8s.	\$16.28 to \$16.52
Belgium	3 7	to 3 8	16.28 to 16.52
France	3 7	to 3 8	16.28 to 16.52
Luxemburg	3 7	to 3 8	16.28 to 16.52
Basic pig iron:(a)	2 18	to 2 19	14.09 to 14.34
Belgium	2 18	to 2 19	14.09 to 14.34
France	2 18	to 2 19	14.09 to 14.34
Luxemburg	2 18	to 2 19	14.09 to 14.34
Coke	0 18		4.37
Billets:			
Belgium	4 5	to 4 7	20.65 to 21.14
France	4 5	to 4 7	20.65 to 21.14
Merchant bars:			C. per Lb.
Belgium	4 15	to 4 18	1.04 to 1.07
Luxemburg	4 15	to 4 18	1.04 to 1.07
France	4 15	to 4 18	1.04 to 1.07
Joists (beams):			
Belgium	4 13	to 4 15	1.03 to 1.04
Luxemburg	4 13	to 4 15	1.03 to 1.04
France	4 13	to 4 15	1.03 to 1.04
Angles:			
Belgium	5 2	to 5 4	1.12 to 1.15
¾-in. plates:			
Belgium	5 12	to 5 16	1.23 to 1.27
Germany	5 12	to 5 16	1.23 to 1.27
¾-in. ship plates:			
Belgium	5 0	to 5 3	1.10 to 1.13
Luxemburg	5 0	to 5 3	1.10 to 1.13
Sheets, heavy:			
Belgium	6 3	to 6 4	1.35 to 1.37
Germany	6 3	to 6 4	1.35 to 1.37

(a) Nominal.

stability than in the previous fortnight or more, buying is still of the hand-to-mouth variety. Rolling mills claim that the differentials on various classes of rolling mill products are not in proportion to costs and a new classification of merchant and special steels is in preparation. Meanwhile price differences have been quadrupled. Beams have been advanced to 780 to 820 fr. (\$21.68 to \$22.80) per ton to domestic consumers, but any improvement in the franc would cause a reduction in the price. In merchant products prices vary according to the works, the district and the size of the order. While prices as high as 850 to 880 fr. (\$23.63 to \$24.46) per ton are quoted occasionally, this is not believed to be the actual market at which business could be done. Merchant steel products are quoted at £4 15s.

BRITISH CUSTOMERS INQUIRE

Small Tin Plate Orders Result from British Strike—Japan Buys Rails Here

NEW YORK, June 23.—Although continued duration of the British coal strike is finally beginning to shift some business to American mills, the few orders that have thus far been diverted are small. A large American tin plate producer has recently booked two orders for export to consumers of the British product, one for about 1000 base boxes, the other for about 1200. An inquiry for a small lot from a Danish consumer specified early August shipment but, as the mill could offer nothing earlier than the middle to the end of August, no business developed. Another large tin plate producer is reported to have booked a sizable tonnage of tin plate as a result of the British strike. Despite the prospect of an increasing demand for export tin plate the export price is apparently unchanged, judging by quotations on Japanese business, which continue at about \$5.55 to \$5.60 per base box, c.i.f. Japan.

The railroads and municipalities in Japan continue fairly active purchasers of American rails and track supplies. The recent inquiry of the South Manchuria Railway Co. for 3000 corrugated galvanized sheets is understood to have been closed with the leading export interest. On rails the Osaka Denki K. K. is reported to have closed through a large Japanese export house for about 1630 Abbott joint plates and 5 miles of 75-lb. high T-rails, to be furnished by two American makers. A gas company in Japan is reported to have closed on about 800,000 ft. of black gas pipe.

Although the Treasury Department decision became effective June 20, arrivals of German steel at the port of New York yesterday and today, accompanied by consular invoices bearing the statement "No bounty paid or received," are apparently entering the country at the regular duties, without extra charge.

Chilean Steel Plant Soon to Be Built

Reports reaching the J. G. White Engineering Corporation, 43 Exchange Place, New York, indicate that the necessary financing has been almost completed for the building of a steel plant and hydroelectric power plant in Chile.

About \$4,000,000 to \$5,000,000 will be expended, of which 60 per cent will go into the electric power development. This will generate power only for electric furnaces in which pig iron is to be produced and also for the steel mills. As there is no coking coal in Chile it has been decided to reduce the ore in electric furnaces, the practice to follow that employed in Sweden and some other European countries. The mills will have an annual output of about 50,000 tons of finished steel.

Iron ore will be obtained from the mines at Tofo, in the north of Chile, under an arrangement with the Bethlehem Chile Iron Mines Co., which mines the ore for the plants of the Bethlehem Steel Corporation

to £4 16s. (\$23.08 to \$23.32) per metric ton, f.o.b. Antwerp. Joists have been sold at as low as £4 11s. 6d., (\$22.24) f.o.b. Antwerp by Lorraine mills and as high as £4 12s. 6d. (\$22.48) by other French makers.

Sheets.—Prices vary on domestic business, ranging from 1300 to 1350 fr. (\$36.15 to \$37.55) in the north of France to as high as 1500 fr. (\$41.70) in other sections. For export the market is more stable although German competition on the thin gages continues keen.

Wire Rods.—Available supplies are small and the price continues high. Producers still look forward to the formation of an association for the fixing of a minimum price. Recent quotations have been about 850 fr. per ton for domestic consumers and £5 6s. 6d. to £5 7s. 6d. (\$25.88 to \$26.12) per metric ton, export.

in this country on a royalty basis under contract with the Chilean Government.

The new steel industry will be protected by the Chilean Government by the establishment of import tariffs and legislation respecting price preference on public works.

The managing director of Compania Electro Siderurgica e Industrial de Valdivia is Ingeniero don Victor M. Navarrette.

DUMPING GERMAN PIG IRON?

Virginia Pig Iron Association Asks Treasury Department to Investigate

WASHINGTON, June 21.—A number of pig iron producers have called the attention of the Treasury Department to the imports of pig iron from foreign countries with the suggestion that they involve violations of the anti-dumping act. One of these communications is from the Virginia Pig Iron Association. In a letter to the Secretary of the Treasury, under date of June 3, C. E. Bertie, Roanoke, Va., secretary of the association, writes as follows:

"In view of the tonnage of foreign foundry pig iron that is now being imported and sold at a very low price on the Atlantic seaboard, especially iron from Germany, it occurs to us that the matter should be carefully looked into without delay and if possible some action taken under the anti-dumping act of 1921.

"Appearances would strongly indicate that this foreign pig iron is being sold at a comparatively lower price than it is sold in its own markets and at a lower price than we can produce similar iron in this country and, as a consequence, the American industry is in danger of serious injury by reason of this apparent dumping of foreign iron on our Atlantic seaboard cities.

"We will not go into the details, for we are sure that through your Customs service you can readily check up on this situation much more quickly and with more accuracy than can we, and can ascertain if this foreign pig iron is being sold in the United States at less than its fair value."

Low Ebb of British Steel Output

LONDON, ENGLAND, (by cable) June 18.—The effect of the coal strike, as well as the general strike, on the steel industry of Great Britain is clearly reflected by the pig iron and steel production for May. The pig iron output was only 88,800 gross tons and the steel, 45,700 tons. This compares with an output in April of 539,100 tons of pig iron and 661,000 tons of steel.

Present conditions are rapidly approaching those which existed in 1921. On that occasion, when the steel industry was practically at a standstill for three months, the number of furnaces in blast fell rapidly from 109 on March 31 to 11 at the end of April and 2 at the end of May. By the end of June no furnaces were in operation. Steel production in the same period fell from 359,000 tons in March to 71,000 tons in April, 6000 tons in May and only 3000 tons in June.

Refractories, Furnaces and Mill Drive

(Continued from page 1789)

similar to the organization now used in steel mill boiler plants. The gas producer manufacturers should incorporate in their proposals necessary controls and instruments, but should leave the choice of make to the buyer. He is strongly in favor of the use of instruments, but expressed the opinion that the management should make sure that the operators understand their use and make full use of them. Instruments make the produc-

tion of good gas easier and attract a better class of labor to that department.

W. P. Chandler, Jr., said that the steam jet blower is not suitable in producer practice with coal of which the ash varies over wide limits in its fusion point. For such coals he favors the turbo-blower, the use of which allows a separate control of steam and air.

A representative of a gas producer manufacturer stated that the makers strongly favor the use of instruments and would like to equip every installation with an instrument board. An estimate of instrument cost would be from \$500 to \$800 per producer.

Additions to Rolling Mills at Steubenville Plant of the Wheeling Steel Corporation

BY MARTIN J. CONWAY*

TO balance the semi-finished and finished departments of the corporation by supplying sheet bar to the Wheeling mills from Steubenville, a demand was created for greater tonnage from the Steubenville plant, which had to be obtained through installation of new mill equipment.

Ideal conditions cannot be hoped for when installing new equipment in an old steel plant. Steubenville did not prove an exception to the rule, as the layout was naturally affected by limited site conditions. The additional mill equipment consisted of a 35-in. two-high blooming mill and a 19-in. continuous bar mill, with the necessary shears, delivery and loading equipment.

Auxiliary to the additional mill equipment mentioned, a new boiler plant, power plant, gas producer plant and two additional rows of soaking pits were installed.

Blooming Mill

The 35-in. two-high reversing blooming mill, together with the pinions and manipulators, were designed and built by the Mackintosh-Hemphill Co. The mill is designed for 32-in. diameter rolls, having a body length of 84 in. and a maximum lift of 31 in. The roll housings are of cast steel with closed top and rest on heavy cast steel shoes having a spread of 8 ft. 4 in., which afford a substantial base for the entire mill structure.

The top roll is balanced by two hydraulic cylinders supported on the outside of each roll housing. The plungers support a steel casting lifting beam, from which rods are suspended which pass through the housings and connect to the top roll carriers.

Continuous Mill

The Morgan continuous bar mill, which is driven by a Nordberg uniflow engine, is composed of eight trains of rolls, designed with extra distance between roll centers for throwing loops between the last five trains of rolls. The mill has also three stands of vertical edging rolls, the housings being designed so that the rolls can be easily and quickly changed.

On the entry side of the mill a preliminary shear is installed, for cropping and cutting the hot steel blooms as delivered from the blooming mill.

Uniflow Engines

Probably the most interesting feature about the new mills is the Nordberg uniflow engines—more especially, the reversing uniflow engine driving the 35-in. blooming mill. The corporation, having already successfully applied uniflow engines to sheet mill operations at Wheeling and Portsmouth, felt that similar good results could be obtained by the uniflow principle applied to a reversing blooming mill engine.

It has generally been conceded that the previous practice of driving blooming mills by means of the type of reversing engine in general use was wasteful in the use of steam, and that as large a saving could be

procured by the use of the uniflow principle if applied to the reversing mill as had been obtained by the use of uniflow drives adapted to non-reversing mills.

It appeared that, if a modern steam plant with a correct system of steam piping, coupled with the uniflow principle of reversing blooming mill engine, were employed, economical results could be obtained with a great reduction in the steam consumed per ton of steel rolled, and at the same time with a great saving in first cost of the installation as compared with an electric-driven mill.

Detailed description of the engine follows, with results of tests made in breaking down 9300-lb. ingots, 22 x 24 in. in section, to 4½ x 9¼-in. blooms and some other sizes. Analysis of the data shows that the engine and air pump consumed 317 lb. of steam per net ton of steel rolled.

Discussion

H. C. Siebert, combustion engineer, Bethlehem Steel Co., said that, in any comparison between electric and steam drive, local conditions must be taken into consideration and that the final analysis will be that of the cost per ton rolled in either case. Comparisons made in the past were between the old type of engine, using 40 to 50 lb. of steam per hphr. and electric plants using 14 to 15 lb. of steam per kwhr. He also pointed out that a modern twin-tandem compound engine requires from 22 to 23 lb. of steam per hphr. But now at Steubenville a uniflow engine, using 16 lb. of steam per hphr., is to be compared with the modern steam-electric plant.

R. O. Schnure, Bethlehem Steel Co., stated that in the Sparrows Point blooming mills the average power consumption per ton of steel rolled is from 17 to 18 kwhr., which figures back to less than 300 lb. of steam per ton rolled, as stated by the author. The Bethlehem mills are widely scattered and are practically 100 per cent electrified and for them to change over to steam would mean the erection of a number of boiler houses.

D. M. Petty, Bethlehem Steel Co., doubted, although he had no figures available, if in the laying out of a new mill steam engines would be given consideration. He would not advocate, however, scrapping a good engine and replacing it with a new motor. He also believed that the question of a steam or an electric drive is a local one but that there are always certain factors, other than that of economy, which are in favor of the electric drive. These are: cleanliness in the motor room; electric transmission lines are easier to maintain than steam lines and he believed that the morale of the plant is superior when electric drives are the rule.

U. Manski, engineering department, General Electric Co., Schenectady, N. Y., called attention to the fact that rolling mill engine tests, made in 1920, showed between 600 and 700 lb. of steam required per ton of metal rolled. He questioned the accuracy of the steam flow-meter record made at the Steubenville test, on the grounds that he did not believe that the uniflow engine was

*Combustion engineer, Wheeling Steel Corporation, Steubenville, Ohio.

capable of the economy represented by 318 lb. of steam per ton of steel rolled, when compared to engines used in the test of 1920.

It was further brought out during the discussion that the first steel mill uniflow engine was installed in 1916 at Youngstown Sheet & Tube Co., Youngstown, Ohio. This was on a bar mill and records show that, after 10 years of continuous operation, through the war period and since that time, it has been necessary to make only one major repair to the engine—the replacement of the crank pin in one of the main bearings.

At the Wheeling Steel Corporation plant, Steubenville, it was decided to install a boiler plant which would equal that normally installed with a new turbine plant. Although preliminary estimates indicated that the economy of the uniflow engine would be close to the figure actually obtained, 318 lb. of steam per ton of steel rolled, the design was based on a figure between 400 and 450 lb. of steam. It was on this latter basis that the comparison was made with electric drive and a steam drive finally decided upon.

G. E. Stoltz, general engineer Westinghouse Electric & Mfg. Co., said that, in the final analysis, the operating engineer can determine from results obtained whether steam or electricity would be used in the future. The designs of both steam engines and electric generating plants have undergone a considerable

change since 1920, and for that reason comparisons made then are not applicable now. As an instance of this, central station operations have changed so that not over 60 per cent of the coal required per kwhr. is used now, as compared with the amount required just following the war period.

Although not having figures available, he was of the opinion that an electric drive at Steubenville, figuring 14 lb. of steam per kwhr., would call for 200 lb. of steam per ton of steel rolled in place of the 318 lb. of steam per ton as was actually obtained by the use of the uniflow engine. Since the war period over 100 old steam engine mill drives have been replaced by electric motors.

W. Stoop stated that the investment cost of the steam-engine mill drive at Steubenville was \$750,000 less than would have been the initial expenditure for electric drive.

Martin J. Conway, the author, in replying stated that a test made at Sparrows Point on an electrically driven mill showed a power consumption of 17 kwhr. per ton produced. Assuming the power cost at $\frac{1}{2}$ c. per kwhr., the cost per ton rolled would be $8\frac{1}{2}$ c. Considering the engine drive at Steubenville, using a steam consumption of 400 lb. per gross ton of metal rolled and a steam cost of 22c. per 1000 lb., fuel cost at Steubenville would be 8.8c. per ton of metal rolled.

NEW TRADE PUBLICATIONS

Centrifugal Pumps.—Climax Engineering Co., Clinton, Iowa. Bulletin G of 6 pages describes direct-connected centrifugal pumps driven by Climax gasoline engines of from 57 to 142 hp. For varying heads these pumps are rated from 500 to 6000 gal. per min.

Steel Welding Rods.—Chicago Steel & Wire Co., 103rd Street and Torrence Avenue, Chicago. Booklet of 24 pages covering in considerable detail the effect of surface materials on steel welding rods. This includes practical suggestions, as well as a technical and non-technical discussion of the effect of surface materials. Specifications are given for Weldite rods for both gas and electric welding.

Pyro-Bestos.—National Asbestos Mfg. Co., 163 Henderson Street, Jersey City. Catalog of 16 pages describing heat insulating material said to be both waterproof and fireproof. It is furnished in 3-ft. lengths to fit any size pipe from $\frac{1}{2}$ in. to 30 in. in diameter. Special fittings are shown for covering pipe fittings and a price list is included.

Rebuilt Machine Tools.—J. L. Lucas & Son, Inc., Bridgeport. List No. 66, 24 pages. Prices are given on a wide variety of machine tools, and a four-page colored insert lists equipment that is specially priced for quick disposal. The booklet includes many illustrations of tools offered.

Laminated Asbestos and Sponge Insulation.—National Asbestos Mfg. Co., 163 Henderson Street, Jersey City. Catalog of 12 pages dealing with insulation of heated pipes, tanks, boilers, etc. Price list is given for materials for both flat surfaces and pipes. This type of insulation is furnished in thicknesses of from $\frac{1}{2}$ to 3 in. for pipes and $\frac{1}{2}$ to 4 in. in sheets measuring 24 x 36 in.

Speed Reducers.—Philadelphia Gear Works, Richmond and Tioga Streets, Philadelphia. Catalog covering worm, spur, herringbone and spiral bevel herringbone units.

Engine and Generator Sets.—Engberg's Electric & Mechanical Works, St. Joseph, Mich. Catalog 302-B, supplementing catalog 302, gives horsepower tables for vertical inclosed self-oiling engines, varying from 2½-in. piston by 3½-in. stroke to 18-in. piston with 10-in. stroke. The horsepower range from a fraction of 1 to a maximum of 108. The tables are based on a variety of maximum steam pressures and of r.p.m.

Oil Burner Specialties.—Imperial Brass Mfg. Co., 1200 West Harrison Street, Chicago. Catalog 607-B of 20 pages covers details for oil burner equipment for use with gravity or pressure feed burners. Trip valves of various types, thermostat and other valves, strainers, couplings, etc., are featured.

Zeolite Water Softener.—Graver Corporation, East Chicago, Ind. Bulletin 509 of 12 pages describes a water

softener depending upon the exchange or Zeolite method. Illustrations include installation views, as well as details showing construction and operation of the equipment.

Tachometers.—Bristol Co., Waterbury, Conn. Catalog 1700 of 24 pages describes an electric tachometer and a pneumatic tachometer for recording and indicating speed of rotation of machinery. Numerous illustrations show method of use and details of the instruments, together with clearance diagrams. Various types of charts are shown to fit different needs. A list price accompanies the catalog.

Forging Machine.—National Machinery Co., Tiffin, Ohio. Four-page folder describing a high-duty heading machine built in sizes from 1 to 7½ in. Strength and power are emphasized.

Boiler Room Instruments.—Paul B. Huyette Co., Philadelphia and New York. Several leaflets describing products of various manufacturers designed for power plant and particularly boiler room use, including water columns, gage cocks, damper regulators, stoking tools, tube cleaners, instruments of various types, and air-tight coatings for boiler settings.

Steel Cross Ties.—Carnegie Steel Co., Pittsburgh. Catalog of 45 pages dealing with railroad ties of various sections and for a variety of uses. These are designed particularly for mining roads and for portable and industrial tracks. One type is shown for street railway use, with the tie embedded in a concrete slab. Illustrations are numerous.

Blue-Printing Machinery, Etc.—C. F. Pease Co., 821 North Franklin Street, Chicago. Comprehensive bound catalog of 372 pages, with price list and discount sheet in a pocket inside the back cover. Draftsmen's and surveyors' instruments of all kinds, together with section paper, field books and a wide variety of allied products are included in the catalog. It is well illustrated, some of the cuts being in two colors. The book is called Catalog G.

Worm Gear Blanks.—Buffalo Bronze Die Cast Corporation, 100 Arthur Street, Buffalo. Four-page folder covering bronze worm gear blanks made by the chill casting or the centrifugal process. Blanks may be made either solid or with teeth cast in, and of metal melted either in the electric furnace or crucible. Photomicrographs of samples of the metal are shown.

Oil Engines.—Ingersoll-Rand Co., 11 Broadway, New York. Catalog of 32 pages illustrating and describing a wide variety of engines for many purposes; giving particulars of general construction, fuel injection, valve operation, lubrication, etc. Both horizontal and vertical units are covered, many being shown attached to air compressors. The sizes run from 55 to 150 brake hp.

Steam Boilers.—Kewanee Boiler Co., Kewanee, Ill. A 16-page folder describing the Kewanee down-draft boiler, in which special attention is paid to riveted joints. These boilers are for both power and heating, one design having the main fuel bed resting upon water pipes and the products of combustion passing down between the pipes to reach the flues.

Machinery Markets and News of the Works

SALES FALL OFF SLIGHTLY

Some Orders Placed During Atlantic City Exposition

Expansion of Facilities by Delco Light Co., Prominent in Prospective Business

A SLIGHT recession in purchasing is reported from most machine tool centers, an exception being the Cleveland district, where improvement in sales is noted.

There are reports of a number of tools having been purchased at the exhibit of the Railway Supply and Manufacturers' Association in Atlantic City last week. Inquiry during the week has been in fair volume.

Prospective business is seen in the plans of the Delco Light Co., Dayton, Ohio, a subsidiary of the General Motors Co., which will expand its facilities for the manufacture of electrical refrigerating units. It is reported that approximately \$7,000,000 will be

appropriated for new equipment, including machine tools.

The Mack Truck Corporation is in the market for several machines. The Chevrolet Motor Co., which placed orders during the week for 12 tools for its Toledo transmission plant, is expected to purchase more machine equipment, including 50 gear hobbors. Shears, bending rolls and other machinery will be required by Arthur G. McKee & Co., Cleveland, for a new fabricating plant at Pulaski, Va.

Lists issued during the week include one for 15 tools for the Board of Education, Louisville, Ky.

The International Harvester Co. has placed an order for 15 turret lathes, and the Illinois Central has made purchases for its Paducah, Ky., shops. The Missouri Pacific has also been a purchaser. An order for engine lathes, turret lathes and milling machines, for export, has been placed in the Cincinnati district.

The machine tool equipment of the Apperson Automobile Co., Kokomo, Ind., will be auctioned July 20-22.

New York

NEW YORK, June 22.

A FAIR amount of railroad buying has developed coincidentally with the railroad conventions at Atlantic City, N. J. The New York Central has bought a carwheel borer, a Western road bought an axle lathe and a Texas road bought a 100-ton bushing press, a 30-in. x 14 ft. engine lathe and a 5-ft. radial drill. A Chicago company has bought a 100-ton bushing press; a company at Carteret, N. J., bought a punch and shear. Other sales included a die sinking machine to a Detroit automobile company; a vertical shaper to another Detroit automobile company; a gear testing machine to a third automobile maker; a 16-in. geared-head lathe to a Detroit company; two 20-in. geared-head lathes to a Worcester, Mass., manufacturer; a vertical shaper and a jig borer to a company at Rock Island, Ill.; a vertical shaper to a railroad in Kentucky; a die sinking machine to a Western railroad; six automatic lathes to a company at New Bedford, Mass.; a 20-in. geared-head lathe, a bench lathe and a bench drill to a steel foundry at Indiana Harbor, Ind., an automatic milling machine to a St. Louis company.

Plans have been filed by the Clyde Iron Works Sales Co., Locust Avenue and 136th Street, for a new one-story plant, 76 x 128 ft., to cost about \$65,000.

Officials of the Marko Storage Battery Co., 1402 Atlantic Avenue, Brooklyn, have organized a new company of the same name, capitalized at \$500,000, to take over and expand the present concern. Work has recently been under way on a new plant in the vicinity of the existing factory for large increase in output. P. M. Marko heads the company.

The Bell Telephone Laboratories, Inc., 463 West Street, New York, is concluding the purchase of 45 acres on the Whippany River, Whippany, N. J., as a site for a new experimental station for the study of high-power radio transmission, to include steel radio towers, power plant, laboratory and other structures. Edward B. Craft is executive vice-president.

The Bullard-Murtha Motor Co., Inc., 902-8 Quentine Road, Brooklyn, is completing plans for a two-story addition to its service and repair building, 80 x 110 ft., to cost about \$175,000 with equipment. Henry Holder, Jr., 242 Franklin Avenue, is architect.

The Long Island Lighting Co., 50 Church Street, New York, is disposing of a bond issue of \$1,500,000, a portion of the fund to be used for extensions and improvements. Work is now under way on a new 30,000-hp. generating station

at Roslyn, L. I. The company is affiliated with the Queens Borough Gas & Electric Co. E. L. Phillips is president.

The New York Central Railroad Co., C. S. White, room 344, 466 Lexington Avenue, New York, purchasing agent, is asking bids until July 1 for a quantity of bars, shapes and plates, serial contract No. 14-1926.

The Standard Oil Co., 26 Broadway, New York, has awarded a general contract to the J. L. Burke Corporation, 51 West Sixty-sixth Street, for a two-story storage and distributing plant on Fifty-fifth Street, Brooklyn, to cost \$65,000.

Motors and other power equipment, conveying and other machinery will be installed in the six-story printing plant for the *New York Evening Journal*, 2 Columbus Circle, New York, for which plans have just been filed, estimated to cost \$1,000,000. Charles E. Birge, 29 West Thirty-fourth Street, is architect.

The Forest Paper Co., 76 Duane Street, New York, has leased the eight-story building at 334-38 Hudson Street, heretofore occupied by the United States Testing Co., and will equip for a new storage and distributing plant. Possession will be taken in the fall. The United States Testing Co. has recently purchased a plant and adjoining land at 1415 Park Avenue, Hoboken, N. J., totaling 150,000 sq. ft. of floor space, and will expand operations at this location.

The A. C. Chesley Co., 704 East 133rd Street, New York, manufacturer of metal-covered and other fireproof doors and kindred products, has taken out a permit for a one-story plant, 100 x 150 ft., estimated to cost \$50,000. Patrick J. Murray, 141 East Fortieth Street, is architect. Adolph J. Chesley is head.

The Troy Community Garage, Inc., Troy, N. Y., care of Frank M. Baucus, Troy Automobile Club, will ask bids early in July for its proposed four-story service, repair and garage building, 75 x 100 ft., to cost \$325,000 with equipment. Saxton Thompson, 257 Broadway, is architect.

Officials of the Sleeper Radio Corporation, 438 Washington Avenue, Long Island City, have organized the Sleeper Radio & Mfg. Co., under Delaware laws, with capital of \$300,000, to take over and expand the present company. Gordon Sleeper is one of the heads of the new company.

Robert E. Farley, 342 Madison Avenue, New York, has awarded a general contract to the Barney-Ahlers Construction Corporation, 110 West Fortieth Street, for a new two-story automobile service, repair and garage building at White Plains, N. Y., to cost about \$150,000 with equipment.

Matthew W. Del Gaudio, 160 West Forty-fifth Street, New York, architect, will soon file plans for a six-story automobile service, repair and garage building on West Twentieth Street, near Fifth Avenue, 75 x 95 ft., to cost \$175,000.

The New York State Bridge & Tunnel Commission and the New Jersey Interstate Bridge & Tunnel Commission, Woolworth Building, New York, are asking bids until Aug. 10 for emergency and utility trucks for use in and

about the Holland Tunnel under the Hudson River. George R. Dyer and Theodore Boettger are chairmen of the respective commissions.

The United States Gypsum Co., 17 State Street, New York, with headquarters at 205 West Monroe Street, Chicago, has plans for a new factory branch and distributing plant at Harrison, N. J., to be 56 x 210 ft. An electric traveling crane will be installed for unloading barges, with other conveying and hoisting equipment, truck loaders, etc.

The Bakelite Corporation, Grove Street, Bloomfield, N. J., manufacturer of radio equipment, etc., has filed plans for an addition to cost about \$20,000. Headquarters are at 247 Park Avenue, New York.

The Karl Bracher Corporation, Belleville, N. J., recently organized with a capital of \$40,000, is breaking ground for a new one-story plant, 40 x 100 ft., for the manufacture of abrasive products, whetstones, etc., to cost about \$30,000 with equipment.

The Triplex Safety Glass Co. of North America, Inc., Hoboken, N. J., recently organized, will operate a local factory for the manufacture of safety glass for automobiles and other service. Amory L. Haskell, formerly vice-president of the General Motors Export Co., New York, is president of the new organization.

Fire, June 11, destroyed a portion of the plant of the Acme Metal Goods Mfg. Co., Newark, occupying a portion of the building at Orange and Ogden Streets, with loss reported at \$25,000, a considerable portion representing machinery and stock. The loss will be replaced. Charles Fischer is one of the heads of the company.

The Board of Education, Metuchen, N. J., will receive bids until July 6 for boiler equipment for the local schools, including mechanical draft apparatus to permit the use of low grade coal.

The Maas & Waldstein Co., Riverside Avenue, Newark, manufacturer of industrial chemicals, has awarded a general contract to the Adams-Faber Co., Inc., 484 Bloomfield Avenue, Montclair, N. J., for a three-story addition, 30 x 160 ft. W. A. Bishop and H. D. Scudder, Union Building, are engineer and architect.

The Queensboro Gas & Electric Co., Far Rockaway, L. I., has work under way on a new generating station on local site with capacity of about 30,000 hp.

The Colonial Tank & Installation Co., 1983 Richmond Terrace, Staten Island, N. Y., has been incorporated to manufacture steel tanks of all descriptions with oil and gasoline storage tanks as a specialty. It will also do steel plate fabrication on contract.

The Union City Iron Works, 716 Twenty-second Street, Union City, N. J., has recently been organized and is engaged in the fabrication of ornamental iron and steel for buildings.

The Schurk Iron Works, Inc., 5425 Manchester Avenue, St. Louis, has been incorporated with capital stock of \$60,000, of which \$31,100 is paid in, and has engaged in the fabricating of structural steel for buildings and will also manufacture iron and wire guards. Although the company has just been incorporated, its plant has been built and in operation for about six months.

Charles C. Phelps, 473 Getty Avenue, Paterson, N. J., and Charles J. Schmid, his associate, have been appointed New York and northern New Jersey representatives for the Uehling Instrument Co., Paterson, the Williams Gauge Co., Pittsburgh, the Combustion Control Division of the A. W. Cash Co., Decatur, Ill., and the National Boiler Protector Co., Dayton, Ohio. Mr. Phelps still retains his connection with the Uehling company as treasurer. Mr. Schmid was formerly Boston representative of the Uehling Instrument Co.

A statement dated March 31, last, filed with the Massachusetts Commission of Corporations by the Carnegie Steel Co., gives its total assets and liabilities as \$341,495,238, which compares with \$322,787,414 at the close of the previous year. Merchandise of March 31, last, was figured at \$16,895,178, cash at \$8,630,292, notes receivable at \$97,920, accounts receivable at \$142,957,673, accounts payable at \$45,330,179, notes payable at \$31,738,337, reserves at \$68,688,969 and the surplus at \$130,487,753. At the close of the previous year the surplus stood at \$125,704,895.

A modified plan for reorganization of the Hydraulic Steel Co., Cleveland, has been put forth by a merchandise creditors' committee. In this plan the assets of the company are listed at \$3,623,467 and the liabilities at \$3,954,307, of which \$280,699 are receivers' liabilities and \$3,673,608 are the company's liabilities. The plan of reorganization includes three corporations, one to acquire the West Side plant, one the East Side plant, and the third a holding company to acquire the securities of the other two.

Philadelphia

PHILADELPHIA, June 21.

CONTRACT has been let by the Soabar Co., 4608 Edmund Street, Philadelphia, manufacturer of price-marking equipment and devices, to the Hughes-Foulkrod Co., 1201 Chestnut Street, for a new one-story plant, 105 x 110 ft., to cost approximately \$65,000. Lockwood, Greene & Co., 100 East Forty-second Street, New York, are architects and engineers. Charles L. Robinson is president.

The Philadelphia Rapid Transit Co., Eighth and Dauphin Streets, Philadelphia, has plans for extensions and improvements in its car house and shop at Girard and Taney Streets, to cost \$50,000.

S. Lesse & Sons, 732 Sansom Street, Philadelphia, jewelry manufacturers, have leased the entire second floor in the building at the southwest corner of Eighth and Chestnut Streets, and will install precision and other equipment for a local plant.

The Container Corporation of America, Inc., now being organized under Delaware laws, will take over and consolidate the plants and properties of the Philadelphia Paper Mfg. Co., Nixon and Fountain Streets, Philadelphia, manufacturer of paper boxes and containers, etc., and the paperboard and container fabricating mills of the Chicago Mill & Lumber Co., 510 North Dearborn Street, Chicago. The new company will dispose of bond issue of \$5,000,000 to carry out the consolidation and for general expansion. Walter P. Paepcke, president Chicago Mill & Lumber Co., will act in a like capacity for the new container organization.

I. Fischman & Sons, 312 South Fourth Street, Philadelphia, manufacturer of soda water equipment and apparatus, has plans for a new three-story factory, 24 x 100 ft., reported to cost \$55,000. Jacob Naschold, 5234 North Second Street, is architect.

Wayne W. Light, head of Wayne W. Light & Co., Land Title Building, Philadelphia, engineers, and associates, have organized the National Freight & Delivery Co. of Philadelphia, with headquarters in the Franklin Trust Building, capitalized at \$40,000,000, to take over and consolidate a number of local motor truck haulage companies. Expansion plans will be arranged to include additional service, repair and operating facilities in conjunction with extensions in motor truck fleets. Mr. Light is president of the new organization; S. C. Hollister is vice-president, and L. B. Stradley, secretary.

The Schneider-Bowman Co., Van Dyke Street, Philadelphia, manufacturer of iron and steel castings, has awarded a general contract without competition to Paul Brosa, 2511 West Huntingdon Street, for its one-story addition, 100 x 100 ft., to cost approximately \$50,000. Clarence E. Wunder, 1520 Locust Street, is architect. Louis Schneider is president.

The Reading Knob Works, Inc., Gregg Avenue, Reading, Pa., is having plans drawn for a new one-story foundry, 72 x 80 ft., primarily for brass casting service. Claude B. Mengel, 1122 Penn Boulevard, Wyomissing, Pa., is architect. Charles L. Heizman is president.

In connection with a proposed reorganization of the New Hope Brick Co., New Hope, Pa., plans are under advisement for expansion in the present works, including the installation of additional kilns, mechanical drying equipment and other machinery. A. V. Wise is in charge of operations.

Pardee Brothers & Co., Inc., Lattimer Mines, Luzerne County, Pa., is considering the construction of a new coal breaker, designed to handle the output of three mines in this section. The machinery will be electrically operated. The breaker is reported to cost in excess of \$200,000 with equipment.

Fire, June 12, destroyed a portion of the plant of the Montour Furniture Co., Montoursville, Pa., with loss reported at \$80,000 including equipment. Plans for rebuilding are under consideration.

The Philadelphia & Reading Railway Co., Reading Terminal, Philadelphia, is said to be planning the construction of a new engine house with shop facilities near Trenton, N. J., to cost about \$70,000 with equipment. Samuel T. Wagner is chief engineer.

The Laurelton State Village, Laurelton, Pa., has had plans prepared by George S. Idell, Corn Exchange Building, Philadelphia, architect, for a steam power plant for central heating service, to cost about \$40,000 with equipment.

The Pennsylvania Power & Light Co., Allentown, Pa., has acquired the Panther Valley Electric Co., operating at Lansford, Summit Hill and vicinity, and plans extensions, including transmission line construction.

The Creek Fork Coal Co., Inc., Hunter Station, near Trevorton, Pa., is making ready to start operations at a local plant, dredging the creek for coal reclamation. It will manufacture a coal brick from anthracite screenings. B. W. Fordham, Trevorton, is general manager.

The Crane Market

VERY little inquiry for either electric overhead or locomotive cranes has appeared in the past week, but several sizable lists for overhead equipment are still pending. The New York Central Railroad is in the market for a 15-ton pillar crane. Robert R. Livingston, engineer, 2 Rector Street, New York, is inquiring for a 15-ton, 57-ft. 5½-in. span hand power crane for shipment to Kingstree, S. C. In locomotive cranes the Queens Borough Gas & Electric Co., Far Rockaway, New York is reported considering the purchase of a locomotive crane.

Among recent purchases are:

Public Service Production Co., Newark, N. J., a 25-ton locomotive crane from the American Hoist & Derrick Co.

McKeown Brothers Co., Chicago, recently in the market for a locomotive crane, has closed locally on a used Universal truck crane.

New Mexico Lumber Co., El Vado, N. M., a log loading crane from the American Hoist & Derrick Co.

Pierce Foundation Corporation, 740 East 141st Street, New York, a new locomotive crane from an unnamed builder.

The American Bronze Corporation, Berwyn, Pa., manufacturer of bronze bars, brass and bronze bearings, has changed its name to the American Non-Gran Bronze Corporation.

The Philadelphia Rust-Proof Co., which specializes in the coating of metals by the Udylite, Parkerizing and Sherardizing processes, has recently moved into its enlarged plant at 109 West Montgomery Avenue, Philadelphia.

New England

BOSTON, June 21.

LOCAL machine tool dealers again report limited sales and inquiries. Joseph Beal & Co. have been awarded a small amount of metal-working tool business by the city of Boston for a trade school, bids for which were placed a month or more ago. Many manufacturers and dealers attended the sale of the plant and equipment of the Northway Motors Corporation, Natick, Mass. The plant was purchased by the mortgage holders. Machine tools sold at very low prices; in one instance a machine costing \$6,000 and today priced at \$7,000, went for \$365. A small amount of metal-working equipment at the plant of the Groff-Bent Corporation, Medford, Mass., steel beds, also has been sold at low prices. The Hartford Board of Contract and Supply has readvertised for bids for furnishing and installing metal and wood-working equipment for a school, having rejected bids first received.

The demand for small tools has dropped still more, the market being quieter than it has been in several months.

The Pilgrim Motor Co., 100 Walnut Street, Somerville, Mass., will erect a one-story 120 x 165 ft. sales and service station on Fellsway East. Plans are private. A small amount of equipment will be required.

The Royal Typewriter Co., Hartford, Conn., has plans for the erection of a two-story, 95 x 210 ft., mill construction manufacturing plant on New Park Avenue.

The Magazine Repeating Razor Co., Bridgeport, Conn., and Newark, N. J., has purchased the plant of the Dalton Mfg. Co., Sound Beach, Conn., where it will consolidate operations. The Dalton company purchased the property in 1919 where it manufactured lathes until the business was moved to New York.

The Western Foundry & Supply Co., Inc., New Britain, Conn., has incorporated with a capital of \$50,000 to operate a brass foundry. Charles A. Danberg and Edward A. Danberg are the owners.

Directors of the New England Pin Co., Winsted, Conn., will shortly take action on the question of consolidating with the Star Pin Co., Derby, Conn., and the National Pin Co., Detroit. The Winsted company is capitalized for \$200,000 and is one of the oldest plants in that town. Should the directors ratify the consolidation the equipment will be moved to Derby. The Derby company is capitalized for \$500,000 and the National Pin Co. for \$150,000.

The Diamond Machine Co., Providence, R. I., manufacturer of grinding machines, advises that the item to the effect that it has leased a building at 543 Marshall Street, Philadelphia, for expansion is incorrect. The company does not intend to make any change in its manufacturing operations to any point other than Providence.

The Dovercraft Co., 456 Potter Avenue, Providence, R. I., has been organized with capital stock of 300 shares of no par value to manufacture drapery fixtures and kindred products. It has a plant fully equipped for this work.

Dwight P. Robinson & Co. have been awarded contract by the Boston & Maine Railroad for an extensive program

of rearrangement and improvement of the Boston freight terminal. Work will begin immediately.

The Barker Steel Co., Boston, has moved from 7 Water Street, to 19 Congress Street.

The North & Judd Mfg. Co., New Britain, Conn., automobile hardware, etc., has purchased the business and plant of August Buerman Co., Newark, N. J., bits and spurs.

The W. A. Ives Co., Wallingford, Conn., manufacturer of screw drivers, bits and other carpenters' tools, has tentative plans for a new one-story factory, 60 x 300 ft., to replace its works recently destroyed by fire. Charles J. Benham is president.

The Metal Saw & Machine Co., 40 Napier Street, Springfield, Mass., has leased the local plant of the Hastings & Schoen Co., 465 Taylor Street, and will occupy at an early date for large increase in output.

The Middletown Stone & Brick Products Co., Middletown, Conn., has been formed with a capital of \$130,000, all paid in, to take over the feldspar quarry and brick plant of the Laurel Brick & Sand Co., Laurel, near Middletown, recently acquired by T. V. Whaley, George L. Baldwin and Sydney Hart, all of Providence, who will head the new organization. Plans are under way for extensions and improvements, and the early resumption of operations.

The Bangor Hydroelectric Co., Bangor, Me., has arranged for an increase in capital from \$10,000,000 to \$12,000,000, a considerable portion of the proceeds to be used for proposed hydroelectric power development. A \$2,000,000 issue of preferred stock will soon be sold.

The Boston Cutting Die Co., 202 A Street, South Boston, is beginning superstructure for its proposed one-story plant, 62 x 80 ft., and will have the building ready soon for equipment. Wilson & Tomlinson, 201 Devonshire Street, Boston, have the general contract.

H. F. Kellogg, 278 Stuart Street, Boston, architect, will soon begin the construction of a three-story automobile service, repair and garage building at John and Pleasant Streets, estimated to cost \$400,000 with equipment.

The W. B. Foshay Co., Minneapolis, Minn., operating the People's Light & Power Co. and other public utilities, has acquired the Burlington Traction Co., Military Post Street Railway and the Vergennes Electric Co., operating at Burlington and Vergennes, Vt., and will consolidate into a new organization to be known as the People's Vermont Hydroelectric Co. Plans are under consideration for extensions and improvements in power plants and systems.

The Hart & Hegeman Mfg. Co., Lawrence Street, Hartford, Conn., manufacturer of electrical specialties, has awarded a general contract to C. P. Waterman, Inc., 43 Farmington Avenue, for a one-story top addition to a present two-story factory. Greenwood & Noerr, Hartford, are consulting engineers.

D. F. Dodd, 84 Broad Street, Pawtucket, R. I., architect, is preparing plans for a one and two-story ice-manufacturing plant to cost \$50,000 with machinery, for a company whose name is temporarily withheld.

The Connecticut Light & Power Co., Waterbury, Conn., has preliminary plans for a new hydroelectric generating station on the Housatonic River, near New Milford. Initial work will consist of an artificial reservoir at Brookfield, Sherman and New Milford, 17 miles long. The project will cost in excess of \$1,000,000.

The Atlantic Gypsum Co., Portsmouth, N. H., recently organized, has acquired the shipyard of the Atlantic Corporation, Freeman's Point, and will remodel for the manufacture of gypsum blocks and other building products. It is expected to have the plant ready for operation early in November. The company will also operate a mill in Nova Scotia.

The Central Maine Power Co., Augusta, Me., has applied for permission to issue bonds for \$5,500,000 and preferred stock for \$1,000,000, of which about \$2,500,000 will be used for new construction, including power plant expansion.

Chicago

CHICAGO, June 21.

REPORTS from machine tool manufacturers and dealers in this district indicate that June sales are not holding up to the May volume. The only active railroad list is that of the Illinois Central, which is closing on the tools for its Paducah shops. The International Harvester Co. is still buying equipment for its Rock Island, Ill., tractor plant. With these exceptions purchases are widely scattered and call for only one or two tools. Inquiry is in fair volume and this is taken as an indication that the current rate of buying will be fairly well sustained through July. Purchasers, however, are inclined to shop and to take their time in reaching decisions. The Santa Fe placed a 42-in. boring mill and the service department of the Mack Truck Corporation is in the market for several machine tools. The machine tool equipment of the Apperson Automobile Co., Kokomo, Ind., will be sold at auction July 20, 21 and 22.

The Federal Machinery Sales Co., 12 North Jefferson Street, Chicago, has recently been made distributor for the line of portable electric machine tools manufactured by the Hisey Wolf Machine Co., Cincinnati.

The Barber-Colman Co., Rockford, Ill., manufacturer of tools, will erect a five-story addition.

The Mitchell Co., 226 North Carpenter Street, Chicago, will build a one-story brick machine shop, 48 x 108-ft., to cost \$10,000. E. N. Braucher, 10 North Clark Street, is the architect.

The Standard Oil Co., 910 South Michigan Avenue, Chicago, will build a one and two-story distributing plant and a garage at 2607 North Keeler Avenue, to cost \$150,000. William Gauger, 36 West Randolph Street, is the architect.

The Wagner Malleable Iron Co., Decatur, Ill., is working out a program for plant extension and general improvement at an expenditure of \$75,000.

Contract has been let by the Symons Clamp & Mfg. Co., 4249-59 Diversey Avenue, Chicago, to the Austin Co., for its one-story addition, 100 x 117 ft., to cost about \$40,000, for which foundations will be laid at once.

Ovens, power equipment, conveying and other machinery will be installed in the one and two-story and basement addition, 100 x 150 ft., at the plant of the Pie Bakeries of America, Inc., Austin and Wood Streets, Chicago, to cost \$350,000. David Mahaffey, 118 North La Salle Street, is architect.

The Colorado Utilities Corporation, Steamboat Springs, Colo., has plans for the construction of a new power house at McGregor, Colo., to cost in excess of \$200,000 with machinery.

The Pilet Scrap Iron & Metal Co., 1257 Blue Island Avenue, Chicago, has plans for a two-story and basement shop addition, 20 x 55 ft., to cost about \$25,000. Jacob Lewis, 64 West Randolph Street, is architect. Samuel Pilet is president.

The Northwestern Collapsible Carrier Co., 2920 Talmadge Avenue, S. E., Minneapolis, Minn., manufacturer of package and cash carrier systems and equipment, is considering the erection of a new two-story and basement factory to cost in excess of \$50,000. Charles A. Woolsey is president.

The Illinois Foundry Specialty Co., Morris, Ill., a subsidiary of the Western Foundry Co., 2634 South Kedzie Street, Chicago, is reported to be planning the erection of a one and two-story addition, to cost more than \$25,000 with equipment.

The Denver Fire Clay Co., 3101 Blake Street, Denver, Colo., manufacturer of crucibles, retorts, etc., has plans for a two-story addition, 40 x 135 ft., to be carried out by day labor.

The Standard Oil Co., 910 South Michigan Avenue, Chicago, has filed plans for a new storage and distributing plant at 2607-41 North Keeler Avenue, to cost \$150,000 with equipment.

The Chevrolet Motor Sales Co., 205 Underhill Avenue, Peoria, Ill., local representative for the Chevrolet automobile, is considering the erection of a new two-story service, repair and garage building, 80 x 175 ft., to cost about \$100,000 with equipment. Thayer K. Morrow heads the company.

The City Council, Pierre, S. D., plans the installation of a pumping plant in connection with a proposed municipal waterworks for which a fund of \$100,000 has been arranged.

Bids will be asked in the near future by the Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

The Board of Education, Wenona, Ill., contemplates the installation of manual training equipment in its proposed two-story and basement high school to cost \$115,000, for which bids will be asked soon on a general contract. John Hanlifen, Nertney Building, Ottawa, Ill., is architect.

The Tool Equipment Sales Co., 18 South Clinton Street, Chicago, has been appointed exclusive agent in Illinois, Wisconsin and eastern Iowa for the Threadwell Tool Co., Greenfield, Mass., manufacturer of carbon steel taps, dies, high-speed and ground-thread taps and small tools.

South Atlantic States

BALTIMORE, June 21.

PLANs are being considered by the Griffith & Boyd Co., Keyser Building, Baltimore, manufacturer of fertilizer products, for rebuilding its mill at Clinton and Fourth Streets, Brooklyn, recently destroyed by fire. The new structure will cost about \$250,000 with equipment. J. Edwin Griffith is president.

The Baltimore Motor Terminals, Inc., Hearst Tower Building, Baltimore, Earle Williams, treasurer, is having plans drawn by C. Howard Crane, 345 Madison Avenue, New York, architect, for a ten-story service, repair and garage building at St. Paul and Center Streets, to cost about \$750,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in the four-story and basement plant, 150 x 400 ft., to be constructed by the Ward Baking Co., 367 Southern Boulevard, New York, at Baltimore, reported to cost \$800,000 with machinery. C. B. Comstock, 110 West Fortieth Street, New York, is architect and engineer. The project has been held in abeyance for several months and is now slated to proceed at once.

The Norfolk & Western Railway Co., N. & W. Railway Building, Roanoke, Va., Clyde Cocke, room 351, purchasing agent, is asking bids until June 30 for equipment and materials to cover requirements from July 1 to Sept. 30, including couplers and parts, contract serial AA-411; wire fencing, contract serial AA-412; locomotive steel tires, contract serial AA-413; steel springs, contract serial AA-414; and wrought steel pipe, contract serial AA-415.

The Sanford Brick & Tile Co., Sanford, N. C., has engaged A. F. Greaves-Walker, director of ceramic department, North Carolina State College, Raleigh, to prepare plans for its new plant, primarily for the production of face brick. It will have a daily capacity of 40,000 brick and is estimated to cost \$100,000 with machinery. The company will also make extensions and improvements in its present plant.

The Central of Georgia Railway Co., Savannah, Ga., has completed plans for a new 19-stall engine house, 94 ft. long, with repair facilities, on local site, to cost \$100,000 with equipment. C. K. Lawrence is chief engineer.

The Jakin Novelty Works, Inc., Jakin, Ga., will have plans drawn for a new one-story plant, 80 x 100 ft., for the manufacture of cabinets and will begin work in the fall. Equipment will include a band saw, cut-off saw, jointer, surfacer and other wood-working machinery, all motor-driven.

The Board of Aldermen, Chester, S. C., is asking bids until July 20 for equipment for the municipal waterworks, including 150,000-gal. capacity elevated steel tank; 50,000-gal. capacity wash-water tank; filtration equipment, etc. Warren H. Booker, Charlotte, N. C., is consulting engineer. J. H. McLure is city engineer.

The Goodyear Tire & Rubber Co., Akron, Ohio, is having plans drawn for an addition to its mill at Cedartown, Ga., 150 x 475 ft., to cost about \$280,000 with equipment. Lockwood, Greene & Co., Healy Building, Atlanta, Ga., are architects and engineers.

The Board of Trustees, Clemson Agricultural College, Clemson College, S. C., has tentative plans for replacing the engineering building recently destroyed by fire, with loss of about \$275,000. It is purposed to reconstruct with two individual buildings, one to be equipped for mechanical shops and laboratory, and the other to be used for drafting rooms, class rooms and other operating service. Rudolph E. Lee is architect for the college.

The Southeastern Power & Light Co., Birmingham, has concluded negotiations for the purchase of the Georgia Railway & Power Co., Atlanta; Macon Railway & Light Co., and Macon Gas Co., Macon, Ga.; General Georgia Power Co. and the Central Georgia Transmission Co. Plans are under way for expansion in power plants and transmission systems. The company also operates in Pennsylvania and other States. George W. Martin is president.

The Hackley Morrison Co., 1708 Lewis Street, Richmond, Va., machinery dealer, has been making inquiries for a turbo-generator, about 7500 kw., 3-phase, 60-cycle, 2300-volt; would consider machine of slightly smaller capacity; also for one belt-driven air compressor, two-stage, working pressure 100-125 lb. per sq. in., 500 cu. ft. capacity, with air receiver; transformers, 5 to 15 kva.; industrial motors, 100 to 25 hp., 3-phase, 60-cycle, 2200 volts; starter for 50-hp. motor, and one 350-kw. engine-generator set, single valve Corliss engine, with generator, 3-phase, 60-cycle, 550 volts, slow speed.

The Susquehanna Power Co., affiliated with the Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has plans for the construction of a permanent railroad from Havre de Grace, Md., to Conowingo, on the State line between Pennsylvania and Maryland. A repair and machine shop and conditioning plant are proposed for the rolling stock. The line will be used by the company in connection with its hydroelectric power development at the last noted place.

The Dorchester Lumber Co., Badham, S. C., is planning the purchase of a steam turbine for the power department at its mill, to be used with a 300-hp. generator.

The Common Council, Elizabeth City, N. C., plans the installation of pumping equipment in connection with a proposed municipal waterworks to cost \$480,000, in which amount bonds will soon be voted. W. C. Olsen is city engineer.

The T. & H. Motor Co., 111 South Davie Street, Greensboro, N. C., has plans for a one-story service, repair and garage building, 60 x 225 ft., on Price Street, estimated to cost \$100,000 with equipment. C. L. Howard is president.

The Hunter Machinery Co., Marion, N. C., has inquiries out for two electric-operated pumping units, from 750 to 1000 gal. capacity per min. each.

The Board of Education, Allendale, S. C., contemplates the installation of manual training equipment in its proposed new consolidated high school to cost \$100,000, for which bids will be asked soon. Willis Irvin, Lamar Building, Augusta, Ga., is architect.

Buffalo

BUFFALO, June 21.

THE International Salt Co., Marine Trust Building, Buffalo, has arranged for a bond issue of \$1,500,000, a portion of the proceeds to be used for general expansion. The company recently took over the plant and property of the Rock Glen Salt Co., Rock Glen, near Mount Morris, N. Y., for \$800,000 and is said to be arranging to dismantle the works, with discontinuance of production here. The company also operates the Retsof Mining Co., Avery Rock Salt Mining Co., and the Detroit Rock Salt Co. Mortimer B. Fuller is president.

The Okade Baking Co., 452 North Franklin Street, Syracuse, N. Y., contemplates the installation of ovens, power equipment, conveying and other machinery in its proposed two-story and basement plant, 50 x 95 ft., to cost \$100,000. Gilbert L. Van Auken, Griffin Square Building, is architect.

The Thomas-Boyce Milling Co., Attica, N. Y., is said to be considering the early rebuilding of the portion of its flour and feed milling plant destroyed by fire June 11, with loss estimated at close to \$200,000 including equipment.

Ice-making and refrigerating machinery, conveying and other mechanical equipment will be installed in the one-story addition to the plant of the Rochester Ice Cream Co., Rochester, N. Y., to cost \$100,000. The McCormick Co., 127 South Negley Avenue, Pittsburgh, is architect and engineer.

The Board of Education, Ebenezzer, N. Y., is considering the installation of manual training equipment in its proposed two-story high and grade school addition to cost \$130,000. Plumer & Mann, 700 Main Street, Buffalo, are architects.

The Malone Light & Power Co., Malone, N. Y., is completing plans for the early construction of a new power plant on the Salmon River, to cost in excess of \$350,000.

The Northeastern Piping & Construction Corporation, North Tonawanda, N. Y., has been incorporated as a subsidiary of the American District Steam Co., of North Tonawanda, and will take over all the contracting work which has heretofore been done by the American District Steam Co. All the materials used by the Northeastern Piping & Construction Corporation will be bought in the open market.

The Isbell Mfg. Co., Cortland, N. Y., has been organized to manufacture the Isbell snow remover, which is a conveyor snow plow. R. Ward Beard is president of the company.

The Endicott Forging & Mfg. Co., Inc., Endicott, N. Y., is now installing the following additional equipment: One No. 9 power bar cutter, manufactured by the Buffalo Forge Co., Buffalo; a Pels shear with capacity of 7 in. sq. soft

steel, manufactured by Henry Pels & Co., New York, and a Sly sandblast mill and dust arrester, manufactured by the W. W. Sly Mfg. Co., Cleveland.

Waldo, Egbert & McClain, Inc., dealer in pig iron, coke, alloys, fluorspar, steel and fuel oil, Marine Trust Building, Buffalo, has changed its name to Waldo, Egbert & Maltby, Inc. Fred E. Gross, for several years one of the company's New York State representatives, has been appointed representative in the New England territory.

The Chemical & Vacuum Machinery Co., Inc., Buffalo, has acquired from the Judelson Evapo-Dryer Corporation, New York, all rights to build and market exclusively the apparatus known as the Judelson evapo-dryer.

Cincinnati

CINCINNATI, June 21.

THERE has been a further recession in machine tool buying, and local builders are having much difficulty in converting a satisfactory volume of outstanding inquiries into orders. However, several large machine tool manufacturers report sales considerably ahead of those in May. In at least one instance the increase is due to purchases by automobile makers. Railroads have closed for small lots of equipment. The Missouri Pacific expended upward of \$40,000 for a number of tools, including a planer, a lathe, a vertical shaper and a radial drill. The Texas & Pacific bought a 30-in. lathe, a 5-ft. right line radial drill and a 100-ton bushing press, while the Union Pacific took a No. 3 axle lathe. The New York Central purchased a 48-in. carwheel borer, and the Pullman corporation contracted for a No. 3 axle lathe. The Board of Education, Louisville, Ky., has issued a list of approximately 15 tools, including eight lathes. A foreign order, involving turret lathes, engine lathes and milling machines, was booked locally.

A New England manufacturer is understood to have bought a planer and a number of other machines at the Atlantic City exhibition last week. The Fort Worth & Denver City Railway, Fort Worth, Tex., bought three No. 131 Ransom grinders, and the Nash Motors Corporation purchased a 22-in. upright drill. A Reading, Pa., company bought a 16-in. shaper, and a California company took a metal saw table.

The Delco Light Co., Dayton, Ohio, a subsidiary of the General Motors Corporation, has plans for the immediate expansion of its facilities for manufacturing electrical refrigerating units at a total expenditure of \$20,000,000. Of that amount \$7,000,000 will go for new equipment and machine tools.

Bids will soon be asked by the Cleveland, Cincinnati, Chicago & St. Louis Railroad Co., Big Four Building, Cincinnati, for its proposed engine terminal and shops in the Riverside district, with main structure, two stories, 50 x 185 ft., estimated to cost \$400,000. H. A. Baldwin is chief engineer.

The Water Works Department, City Hall, Columbus, Ohio, C. B. Hoover, superintendent, has preliminary plans for a three-story and basement repair and service works on West Spring Street, 100 x 135 ft., with machine shop, pipe department, etc., estimated to cost \$90,000 with equipment. R. H. Simpson is city engineer.

The Casey-Hedges Co., Vulcan Street, Chattanooga, Tenn., manufacturer of boilers, tanks, etc., is reported to be planning the construction of a one-story addition for the production of steel barrels and drums, reported to cost in excess of \$75,000.

The Michaels Art Bronze Co., Scott Street, Covington, Ky., has awarded a general contract to the B. T. Wisenall Co., Crescent Street, for its four-story addition, 60 x 62 ft., to cost \$45,000.

The L. J. Breed Equipment Co., James Building, Chattanooga, Tenn., machinery dealer, has inquiries out for a steam shovel, about $\frac{3}{4}$ -yd. capacity, mounted on crawlers; also for a number of steel underframe cars, 50 ft., standard gage, flat or box.

The Kinnear Mfg. Co., Field and Yeoman Avenues, Columbus, Ohio, manufacturer of steel rolling doors and shutters, has awarded a general contract to the Middle States Construction Co., 457 Cleveland Avenue, for a one-story addition, 140 x 147 ft., to cost about \$90,000. A portion of the structure will be equipped as a galvanizing works. Richards, McCarty & Bulford, 534 East Broad Street, are architects.

The Kingsport Foundry & Machine Works, Kingsport, Tenn., has plans for two new one-story units, 80 x 180 ft., and 40 x 80 ft., the latter to be used as a foundry. The company will remove equipment from a plant at Marion, Va., recently acquired, to Kingsport, with the installation of other new machinery. A new office building, 28 x 30 ft., will also be built. J. B. Burger is general manager.

The Tennessee Electric Power Co., Chattanooga, Tenn., has acquired the municipal electric power plant and water-works at Harriman, Tenn. Plans are under way for extensions and the installation of additional equipment.

The Royal Blue Bed Springs Co., Dempsey Street, Cincinnati, manufacturer of steel springs, etc., has plans under way for a one-story factory on the Fricke Road, to cost about \$50,000 with equipment. Bert Baldwin, Second National Bank Building, is architect and engineer. Col. W. Lathrop is president and general manager.

The Board of Education, Memphis, Tenn., has asked bids on a general contract for a one-story manual training shop, 56 x 196 ft., at the negro school at Broadway and Lauderdale Avenue, to cost about \$23,000 exclusive of equipment. Regan & Weller, Bank of Commerce Building, are architects.

Cleveland

CLEVELAND, June 21.

MACHINE tool business improved somewhat the past week and the trade has taken a more optimistic view of the outlook than it did early in the month. A local turret lathe manufacturer booked an order for 15 machines from the International Harvester Co. and single orders for several machines at the recent exhibition of the Railway Supply & Manufacturers' Association at Atlantic City. The Chevrolet Motor Co., which recently came into the market for equipment for plant extensions, placed orders the past week for about a dozen milling machines and automatic screw machines for its Toledo, Ohio, transmission plant. Other machinery required will include about 50 gear hobbers, grinding machines and drilling machines for this plant.

Arthur G. McKee & Co., Cleveland, will require shears, bending rolls and punch presses for a new fabricating plant which it will equip at Pulaski, Va.

The plant of the Warren Iron & Steel Co., Warren, Ohio, has been purchased by R. B. Wick, representing the bondholders' committee, for \$350,000. It has not been in operation the past year.

The W. S. Tyler Co., Cleveland, will erect a one-story factory addition, 59 x 100 ft. The general contract has been placed with the Samuel W. Emerson Co.

The Toledo Casket Co., Toledo, Ohio, will build a three-story factory, 50 x 154 ft. A general contract has been placed with the A. Bentley & Sons Co.

The Domestic Electric Co., 7209 St. Clair Avenue, Cleveland, will erect a two-story addition, 40 x 150 ft.

The Browning Crane Co., 16216 Waterloo Road, Cleveland, will erect a one-story addition.

The Alliance Tank Co., Alliance, Ohio, will take bids shortly for its new factory, 54 x 80 ft.

The Owen Bottle Co. will soon take bids for a building, 500 x 600 ft., to be erected at its Huntington, W. Va. plant. This will be the first unit of an extensive building program.

The Columbian Vise & Mfg. Co., Cleveland, has placed contract with the J. L. Hunting Co. for a new plant at 9021 Bessemer Avenue, one and two stories, 75 x 160 ft. The company was recently organized to take over the manufacturing business of the Columbian Hardware Co. Its products include vises and drop forge steel clamps for the automobile industry.

The Bourne-Fuller Co., Cleveland, has placed contract with the H. K. Ferguson Co. for a new four-story manufacturing unit, 98 x 105 ft., for its bolt and nut works.

The Mills Co., Cleveland, manufacturer of sheet metal partitions, shop equipment and other sheet metal products, has purchased the factory buildings on Wayside Road, formerly occupied by the Jones Gear Co. and later by the L. & M. Axle Co. The buildings contain about 50,000 sq. ft. of floor space and occupy a 10½ acre site.

The Rex Products Co., 5606 Euclid Avenue, Cleveland, manufacturer of screw machine products, has placed a contract for a one-story plant, 69 x 168 ft., at 1916 East Fifty-fifth Street.

Pittsburgh

PITTSBURGH, June 21.

PLANs have been filed by the Heppenstall Forge & Knife Co., 4620 Hatfield Street, Pittsburgh, for a one-story addition.

The Campbell-Horrigan Granite Co., 4732 Pennsylvania Avenue, Pittsburgh, has plans for a one-story addition to cost more than \$25,000 with equipment. T. B. and Lawrence Wolfe, Century Building, are architects.

The Fredericktown Coal & Coke Co., Fredericktown, Pa., has plans for the construction of a new steel coal tippie on the Monongahela River, opposite Martin Station, to replace a present obsolete structure.

The American Brake Shoe & Foundry Co., 505 Preble Avenue, Pittsburgh, has plans for two one-story additions, 43 x 46 ft., and 30 x 40 ft., to cost about \$45,000.

The MacAlpin Coal Co., Union Building, Charleston, W. Va., has plans for rebuilding the screening plant at its MacAlpin mine in Raleigh County, with the installation of new equipment.

The Guyan Machine Shops, Logan, W. Va., machinery dealer, has inquiries out for grinders suitable for edging milling cutters; also for a punch and shear to handle material up to 1½ in. thick, a quantity of cold rolled shafting from 1½-in. diameter to 4½-in., and for a combination band and circular saw.

The Jones & Laughlin Steel Corporation, Pittsburgh, will construct a cantilever type coal-handling bridge on the Ohio River at its Neville Island property, recently acquired.

The School District of Wilkesburg, Pa., L. R. Hagan, secretary, plans the installation of manual training equipment in its proposed three-story and basement Horner school, estimated to cost \$300,000, for which bids will soon be asked on a general contract. Arden & Harlow, Farmers' Bank Building, Pittsburgh, are architects.

The Huntington Stove & Foundry Co., Huntington, W. Va., is said to be planning extensions and improvements in its plant with the installation of additional equipment. D. A. Mossman is president.

The Reznor Mfg. Co., Mercer, Pa., manufacturer of gas stoves, etc., is extending its line to include the production of a sizable gas heater designed to replace a coal furnace, and expects to devote considerable capacity to this unit.

John A. Householder, Elizabeth, Pa., operating sand and gravel properties at West Elizabeth, will construct a sand and gravel hoisting plant on the Monongahela River, at the last noted place. Work will begin soon.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, will establish a new service and repair branch in a building on Cleveland Avenue, Fairmont, W. Va., including electrical repair and machine shop, parts department and stock division.

The Electrolabs Co., 2635 Penn Avenue, Pittsburgh, manufacturer of oxygen, hydrogen, oxy-hydrogen generators and equipment, welding and cutting apparatus and appliances, has changed its name to the Gas Industries Co.

St. Louis

ST. LOUIS, June 21.

PLANs are being considered by the Steel Fixture Co., Topeka, Kan., for a one-story addition, work to begin in the fall. A new warehouse and distributing plant will also be built. James Singleton is company engineer. Harry K. Brooks is head.

The Kettle Creek Refining Co., El Dorado, Ark., plans to rebuild the portion of its oil refinery recently destroyed by fire, with loss reported at \$50,000 including equipment. W. B. Hassett is president.

Ovens, power equipment, conveying and other machinery will be installed in the one and two-story plant, 110 x 125 ft., to be constructed by the General Baking Co., 342 Madison Avenue, New York, at Enid, Okla., to cost about \$175,000. C. B. Comstock, 110 West Fortieth Street, New York, is architect and engineer.

The Missouri Hydro-Electric Power Co., Land Bank Building, Kansas City, Mo., has preliminary plans for a proposed hydroelectric power development on the Current River, near Eminence, Mo., where one of a series of three power dams will be located. The entire project will cost in excess of \$750,000.

The Bolene Refining Co., Enid, Okla., is carrying out an expansion and improvement program at its oil refinery, to cost approximately \$350,000 including additional equipment. Present work includes a new reducing and absorption plant. The company recently took over the local refinery of the

Oil State Refining Co., for expansion. It is expected to complete the expansion work early in November.

The Common Council, Branson, Mo., contemplates the installation of pumping equipment in connection with a proposed municipal waterworks and sewage system to cost \$40,000. The Alexander Engineering Co., Woodruff Building, Springfield, Mo., is consulting engineer.

The B. F. Avery & Sons Co., 114 North Main Street, Little Rock, Ark., manufacturer of agricultural implements, with headquarters at Louisville, has plans for a new factory branch and distributing plant at 701 East Markham Street, Little Rock, to cost approximately \$50,000 with equipment.

The Cordell Oil Co., Rogers, Ark., has acquired a 6-acre tract for the construction of a new storage and distributing plant, to cost in excess of \$75,000 with equipment.

The Common Council, Boise City, Okla., plans the installation of a pumping plant in connection with extensions and improvements in the municipal waterworks. A 40 to 60-hp. oil or gas fuel engine will be installed. The E. W. Gantt Engineering Co., West Main Street, Oklahoma City, Okla., is engineer.

The Revelation Aluminum Mfg. Corporation, 1714 Bartlett Street, St. Joseph, Mo., has been incorporated and its plant is now in operation and fully equipped for the manufacture of aluminum, brass and bronze die castings.

The Geneva Mfg. Co., Ste. Genevieve, Mo., has been incorporated with capital stock of \$50,000, to manufacture electric washing machines. It has a plant fully equipped, but is in the market for materials. John W. Schwent is secretary and treasurer.

The Vulcan Mfg. Co., 1511 Cypress Avenue, Kansas City, Mo., maker of washing and ironing machines, has purchased property on the south side of Seventeenth Street between Bales and Askew Avenues as a site for a new plant.

Detroit

DETROIT, June 21.

THE Yellow Coach Mfg. Co., 5801 Dickens Avenue, Chicago, manufacturer of taxicabs, is considering the construction of a new branch plant at Pontiac, Mich., to cost about \$100,000 including equipment. John A. Ritchie is president.

The Sauzedde Wire Wheel & Tool Co., care of the Chamber of Commerce, Mount Clemens, Mich., has negotiations under way for the purchase of a local site for a new plant.

The Union Steel Products Co., Albion, Mich., has acquired the property and business of the Blackledge Mfg. Co., Chicago, manufacturer of steel specialties, and will consolidate with its organization. Expansion is planned.

Andrew Clubb, Penobscot Building, Detroit, architect, has plans for a two-story automobile service, repair and garage building, 140 x 150 ft., to cost \$100,000, for which foundations will soon be laid.

The Denby Truck Co., Detroit, has authorized plans for the construction of a new motor truck manufacturing plant at Los Angeles for its Pacific Coast subsidiary, the Denby Motor Truck Co. of California. It will cost about \$200,000 with equipment. Sidney H. Hale is president.

The Gibb Welding Machine Co., Bay City, Mich., manufacturer of spot and other welding equipment and devices, has begun the erection of an addition to cost in excess of \$45,000, designed to double the present capacity.

A company is being formed under New Jersey laws by officials of the American Seating Co., 901 N. W. Broadway, Grand Rapids, Mich., manufacturer of school, church and theater furniture. The new company will have a larger capitalization and will take over and expand the present organization, continuing the construction program now under way, including a new plant at Grand Rapids, to cost close to \$2,500,000 with machinery. Arrangements are being made to issue securities in an amount of about \$10,000,000, a portion of the proceeds to be utilized for the expansion.

The Board of Education, Alma, Mich., is planning the installation of manual training equipment in its proposed two-story and basement high and grade school to cost \$225,000, for which bids have been asked on a general contract. The Warren, Holmes & Powers Co., Tussing Building, Lansing, Mich., are architects.

The plant, equipment and other assets of the Field Body Co., Owosso, Mich., manufacturer of automobile bodies, bankrupt, will be offered at a public sale on June 30.

The Board of Eaton County Road Commissioners, Charlotte, Mich., has plans for a one-story automobile service, repair and garage building, 70 x 145 ft., for County motor trucks and cars, reported to cost about \$60,000 with equipment.

The General Motors Corporation announces the purchase of the Flint Motor Co.'s assembly plant at Flint, Mich., the building to be used for the manufacture of steel automobile bodies. The Flint Motor Co. will continue its manufacturing operations in its other buildings.

The Harrison Basket Co., Shelby, Mich., has recently been incorporated and has changed its name to the Harrison Mfg. Co. It has been manufacturing fruit and vegetable packages for the past 25 years, but now expects to expand its business to include wood and metal novelties. The company has two plants, one at Hart and the other at Shelby, Mich.

Milwaukee

MILWAUKEE, June 21.

INDICATIONS point to a more active demand for machine tools, inquiry already showing a quickening. Sales so far in June somewhat exceed those for the same period in either May or April, although falling below this period a year ago. Sentiment is changing for the better. Employment in Milwaukee has shown a decline of 1.9 per cent in the past month, yet is 7 per cent above a year ago, due to the activity of foundries and machine shops.

The J. M. Nash Co., Milwaukee, has been incorporated in Wisconsin with a capital stock of 1000 shares of common without par value, organized by J. M. Nash to take over his woodworking machinery business at 342 Thirtieth Street. Additions are contemplated. The Nash company is a pioneer in lathes and other equipment for making fancy woodwork, handles, carved stock, etc. Dwight A. Cooley and E. T. Wright are associated with Mr. Nash in the industry.

The Common Council, Menasha, Wis., has ordered plans and specifications for a new 600-hp. six-cylinder Diesel type engine and generator installation in the municipal water and light plant. The estimated cost of the work is in excess of \$100,000.

The Chain Belt Co., Milwaukee, will ship on July 1 two carloads of traveling water screens and other special equipment for use in copper mining in Chile. Two large concrete mixer units are being completed for the Panama Canal Commission, to supplement a like number delivered a year ago.

The Board of Education, West Allis, Wis., has engaged Lindl & Schuette, architects, Plankinton Building, Milwaukee, to prepare plans and estimates for a vocational training institute. An investment of about \$250,000 in building and equipment is contemplated. Fred H. Haker is president of the board.

The Board of Education, Marion, Wis., will proceed with the erection of a combined high, vocational and graded school to cost about \$200,000, and has commissioned Smith & Brandt, architects, Manitowoc and Appleton, Wis., to prepare plans. Work will start about Aug. 1. M. R. Durkop is secretary of the board.

Indiana

INDIANAPOLIS, June 21.

THE Cook Brothers Foundry Co., Winchester, Ind., manufacturer of gray iron castings, has preliminary plans for a one-story addition, 50 x 80 ft. Erection will probably be deferred until fall.

The Citizens' Gas Co., Indianapolis, has taken out a permit for a new one-story pumping plant at Grace and Prospect Streets. It will also build a new storage and distributing plant at the same location to cost approximately \$70,000 with equipment.

Vonnegut, Bohn & Mueller, Indiana Trust Building, Indianapolis, architects, will soon take bids on a general contract for a two-story and basement automobile service, repair and garage building, 95 x 300 ft., to cost about \$70,000 with equipment.

The Wabash Hydroelectric Co., care of John A. Shafer, Indianapolis, consulting engineer, has applied for permission to construct a hydroelectric generating plant on the Wabash River, near Logansport, Ind., reported to cost in excess of \$500,000 with transmission system.

The Jasper Office Furniture Co., Jasper, Ind., has plans under way for a new one-story plant at Ferdinand, Ind., to cost about \$30,000. John Schnaus heads the company.

The Lincoln Motor Co., 3 South Fourth Street, Evansville, Ind., is considering the erection of a new two and three-story service, repair and garage building, 125 x 150 ft.,

to cost about \$100,000 with equipment. John W. Walton is head.

The Board of Education, Lebanon, Ind., plans the installation of manual training equipment in a proposed two-story and basement high school to be erected in Jefferson Township, to cost \$100,000, for which bids will soon be asked on a general contract. Henkel & Hanson, Heineman Building, Connersville, Ind., are architects. Bevington & Williams, Indiana Pythian Building, Indianapolis, are mechanical engineers.

The Kuhner Packing Co., Thirteenth and Whitely Streets, Muncie, Ind., is said to be arranging for the installation of a refrigerating plant in its proposed two-story and basement addition, 90 x 180 ft., to cost \$200,000 with equipment. Henry Kuhner is president.

The Gary Heat, Light & Water Co., Gary, Ind., has plans for the immediate erection of a new three-story and basement building for equipment storage and distribution, with automobile service and repair shop, totaling in all 125 x 125 ft., to cost \$200,000 with equipment. George W. Maher, 157 East Erie Street, Chicago, is architect.

The Kokomo Steel & Wire Works, Kokomo, Ind., will begin rebuilding the portion of its plant recently destroyed by fire, the work to include the construction of a new one-story unit, 150 x 400 ft., to cost about \$150,000 with equipment.

The Henry Wels Mfg. Co., Elkhart, Ind., whose plant was recently moved from Atchison, Kan., has discontinued the manufacture of automobile fenders, and its present line of products includes steel toilets, shower and dressing room compartments, hospital ward and waiting room cubicles, combination steel door frames and trim, and shower compartments.

Gulf States

BIRMINGHAM, June 21.

PRELIMINARY plans are being arranged by the Texas Stone Products Co., Santa Fe Building, Dallas, Tex., for a new crushing plant in the vicinity of Amarillo, Tex., to cost approximately \$150,000 with machinery.

The Sinclair Refining Co., Sinclair Building, Tulsa, Okla., has plans for a new storage and distributing plant at Miami, Fla., where site has been secured on N. W. Seventy-third Street, to cost \$60,000 with equipment.

The Standard Lumber Co., Live Oak, Fla., is in the market for one single-stage steam-driven air compressor, about 100 lb. air pressure and 300 cu. ft. air displacement per min.; one single-stage steam-driven air compressor, about 6-in. steam cylinder, 6-in. stroke, 7½-in. air cylinder to furnish about 100 cu. ft. air at 100 lb. pressure; one 11-in. x 12-in. air compressor, equipped with type S5 governor.

Stringer Brothers, Inc., Gadsden, Ala., manufacturer of pipe, pipe fittings, etc., is said to be completing plans for a one-story foundry, 200 x 200 ft., on the Coosa River, East Gadsden, to cost in excess of \$150,000 with equipment. This will be the first of four units planned by the company at this location. Headquarters are at 109 North Dearborn Street, Chicago.

The Texas Central Power Co., San Antonio, Tex., plans extensions and improvements in the electric light and power station and ice-manufacturing plants at Brackettville, Tex., recently acquired, with the installation of additional machinery. It will also enlarge the electric power plant at Moulton, Tex., lately purchased, and install additional machinery.

The Etie Sheet Metal Works, Inc., 1510 Washington Street, Houston, Tex., has awarded a general contract to James M. L. West, 3002 North Main Street, for a two-story addition, 50 x 105 ft., to cost about \$25,000 with equipment.

The Petroleum Products Corporation, Independence, Kan., will make extensions and improvements in the refinery of the Ranger Refining Co., Ranger, Tex., recently acquired, including the installation of a cracking unit for gasoline production and the remodeling of a portion of the structure, with equipment installation for the production of mineral rubber products. The complete project will cost \$250,000. C. C. Rodgers, Pittsburgh, is vice-president.

The Highway Marker Advertising Co., 821 New Orleans Bank Building, New Orleans, is arranging for early lease of a local building for the establishment of a metal-working plant to manufacture highway signs and markers. Cutting and welding equipment and other machinery will be installed.

The Crystal River Rock Co., Crystal River, Fla., is contemplating the installation of a new crushing and screening plant at its local properties, with a capacity of about 4000 tons per day.

The Town Council, Gulfport, Fla., is asking bids until July 6 for equipment for extensions in the municipal waterworks, including a 500 gal. per min., deep-well pumping unit, electrically operated; 60-hp. gasoline engine for auxiliary service; automatic control panel for pumping unit; 60,000-gal. capacity elevated water tank on 100-ft. steel tower, and accessory apparatus. W. W. Swift is town clerk.

The Owens Universal Joint & Gear Co., Lake Worth, Fla., is said to have preliminary plans under way for a new factory at Jasper, Ala., to cost about \$25,000.

The Mississippi Power Co., Columbia, Miss., plans to rebuild the portion of its electric power station destroyed by fire June 14, with loss reported at \$20,000 including equipment.

The Board of Education, Huntsville, Ala., is considering the installation of manual training equipment in its proposed new high school in the Campbell section to cost \$150,000, for which bids will soon be asked on a general contract. The R. H. Hunt Co., Chattanooga, Tenn., is architect.

The Woodward Mantel Co., 1724 N. W. Twenty-third Avenue, Miami, Fla., manufacturer of one-piece reinforced fireproof mantels, has plans under advisement for enlargements and additional equipment to double the present output.

The Prairie Oil & Gas Co., W. S. Fitzpatrick, chairman of the board, Independence, Kan., has authorized plans for the construction of a new pipe line from a point in the Panhandle oil fields in Eastland County to Amarillo, 400 miles long. It is estimated to cost close to \$500,000 with accessory apparatus. Nelson K. Moody, Independence, is president.

The White Co., 2010 Avenue C, Birmingham, manufacturer of motor trucks, with headquarters and plant at Cleveland, has leased a one-story and basement building, 140 x 150 ft., to be erected by C. H. McCauley, Jackson Building, estimated to cost \$80,000. It will be equipped as a repair and service works.

The Auto Block Mfg. Co., Montgomery, Ala., is said to have authorized plans for the rebuilding of the portion of its plant recently destroyed by fire, with loss of about \$75,000 including equipment.

The Board of Water Commissioners, Lula, Miss., has rejected bids recently received for equipment for extensions in the municipal waterworks, including motor-driven centrifugal pump, 50,000-gal. capacity steel tank on 100-ft. steel tower, gate valves and auxiliary apparatus. It is expected to ask new bids soon. The Southern Engineering Co., Clarksdale, Miss., is engineer.

Pacific Coast

SAN FRANCISCO, June 16.

PLANs are being completed by the Oakland Steel Co., Ray Building, Oakland, Cal., for a one-story plant, 100 x 100 ft. E. W. Olin is president.

The City Commission, Pasadena, Cal., is considering recommendations from the municipal light and power department for an addition in the municipal electric power plant, to include the installation of a 15,000-kw. turbo-generator, 1000-hp. boiler, condenser and auxiliary equipment, estimated to cost \$750,000, for which a fund is available from surplus earnings. Benjamin F. Delanty is manager of the municipal light and power department.

The Ahlberg Dual Transmission Co., 120 West Twenty-second Street, Los Angeles, manufacturer of automobile transmissions, etc., is having plans prepared for a new one-story factory, 100 x 120 ft., at Culver City, near Los Angeles. Work will soon begin. Samuel Bryant is company engineer.

The Portland Electric Power Co., Portland, Ore., is disposing of a bond issue of \$3,750,000, a portion of the proceeds to be used for extensions and improvements in power plants and system. Franklin T. Griffith is president.

The Pipe Auto Trailer Works, Inc., 701 East Seventh Street, Los Angeles, has awarded a general contract to J. M. Cooper, Rives-Strong Building, for a new one-story plant, 45 x 200 ft., to cost about \$40,000 with equipment.

The Puget Sound Power & Light Corporation, Seattle, Wash., has awarded a general contract to Stone & Webster, Inc., Seattle, for a new one-story and basement equipment storage and distributing plant, 150 x 300 ft., including machine shop and repair department, meter department, etc., to cost \$200,000 with equipment.

The Pacific Gas & Electric Co., San Francisco, has filed plans for a one-story addition to its power plant at Marysville, Cal.,

Ovens, power equipment, conveying and other machinery will be installed in the proposed one and two-story plant to be constructed at Glendale, Cal., by the Weber Baking Co.

Los Angeles, to cost \$175,000 with equipment. Gene Verge, Petroleum Securities Building, is architect.

Peter Koford, Fairfield, Solano County, Cal., has work under way on a new plant for the manufacture of concrete roofing tile and kindred products.

The Southern California Edison Co., Los Angeles, has plans for a new one-story equipment storage and distributing plant at San Bernardino, Cal., including service, repair and garage building for company motor trucks and cars, to cost about \$60,000.

The Tranquillity Irrigation District, Tranquillity, Cal., has rejected bids recently received for electrically-operated deep-well pumping equipment and will ask new bids soon.

Canada

TORONTO, June 21.

SALES of machine tools are showing some improvement, and inquiries are more numerous. There is a considerable volume of prospective business in sight both on domestic account and from foreign purchasers. Several large plants are under construction for which equipment will be required shortly. The Manitoba Foundries Co., Selkirk, Man., will require considerable equipment for its new plant. The automotive industry is showing more interest, and purchases on replacement account are increasing. Inquiries are also appearing for mining machinery from the northern Ontario district.

Bids are being received by Norman Mann, architect, 1950 Main Street, Niagara Falls, Ont., for an addition to the plant of the Niagara Wire Weaving Co., Niagara Falls. The estimated cost is \$35,000.

The Mistassini Power & Paper Co., Ltd., has been granted a Quebec charter and has taken over the timber limit and two waterpowers recently purchased from the Quebec Government by the Leaside Engineering Co., Ltd., Leaside, Ont. The Mistassini company will erect a complete newsprint paper mill with a capacity of 200 tons per day, and will develop its own waterpower. S. A. Wallberg is president and principal owner of the new company, and John Staller is general manager. While the plant is under construction the company will have its engineering offices in the Drummond Building, Montreal.

Hutton & Souter, architects, 6 James Street, Hamilton, Ont., are preparing plans for an addition to the plant of General Motors of Canada, Ltd., 52 Mary Street, Oshawa, Ont. It will be 90 x 600 ft., one story, of monitor type construction. Other improvements are also planned.

Noranda Mines, Ltd., Noranda, Que., in connection with the construction of a smelter, has placed an order with the Canadian Bridge Co., for 3000 tons of structural steel. Bids are now being called for smelting plant equipment, etc.

The rolling mill buildings of the Steel Co. of Canada, Ltd., at Belleville, Ont., dismantled some time ago, have been purchased by the Houston Co., Tweed, Ont., which will convert them into a sash and door factory. Machinery and wood-working equipment will be purchased.

The Kroehler Mfg. Co., Ontario Street, Stratford, Ont., has let some contracts, including that for reinforcing steel to the Stratford Bridge & Iron Works, Erie Street, in connection with a \$200,000 addition to its factory.

The Canadian International Paper Co., Ltd., Notre Dame Street, Three Rivers, Que., proposes to build an addition to a power plant at Farmer Rapids, near Hull, Que., to develop 58,000 hp. It also contemplates the erection of a new power plant at Six Portages on the Gatineau River, and the construction of a dam at Nigger Rapids near Maniwaki, Que.

The Ruberium Products Co., Barrie, Ont., manufacturer of electrical supplies, switchboard equipment, radio equipment, etc., has secured a building and will install equipment for manufacturing. The estimated cost of the undertaking is \$200,000. D. Miller is manager of the company.

The mills of the Gull River Lumber Co., and the Lindsay Woodworking factory at Lindsay, Ont., were destroyed by fire June 17 with a loss of \$100,000. Considerable machinery is a total loss and will have to be replaced. It is expected that reconstruction will start immediately.

Beaudet & Co., Mont Joli, Que., will build a machine shop and are interested in tools and equipment.

Aristide Pigeon, 815 Carriere Street, Montreal, is build-

ing a garage and automobile repair plant and will purchase equipment.

H. P. Monsarrat, Riviere de Loup, Que., will rebuild a foundry recently destroyed by fire and is interested in equipment. It will cost \$75,000.

Western Canada

The Manitoba Foundries Co., Selkirk, Man., whose plant was recently destroyed by fire, is rebuilding on the old site and will purchase new equipment. It will cost \$150,000, complete.

The City Commissioners, Calgary, Alta., have approved plans to build an addition to No. 1 substation on Ninth Avenue, West, at a cost of \$28,000. The building will cost \$10,000 and \$18,000 will be spent on machinery. J. M. Miller is city clerk.

A. B. Sanborn, general manager of the East Kootenay Power Co., Fernie, B.C., states that work will start soon on the erection of an auxiliary steam plant to be located either at Fernie or Elko, B.C., to develop an additional 5000 hp. The cost is estimated at \$1,000,000.

Foreign

THE Government of Uruguay, Montevideo (Administracion general de las Usinas Electricas del Estado) is asking bids until July 26 for a quantity of electric cable, including 14 miles of 6600-volt cable, and like amount of 220-volt cable. Specifications on file at the office of the Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, reference Uruguay-EE 1016.

The Government of New Zealand, Wellington, is asking bids until Nov. 2 for two turbines, generators and complete auxiliary equipment, including tools, etc.

Hugh L. Cooper & Co., 101 Park Avenue, New York, consulting engineers, have been engaged by the Russian Soviet Government to make a survey and prepare plans for the proposed hydroelectric generating plant on the Dnieper River. The ultimate station will have a capacity of 600,000 hp., with steel tower transmission system for a radius of about 100 miles for service to new metallurgical plants, ferromanganese works, aluminum and other plants in this district. The project will be carried out under the direction of the Dnieper Power Commission, J. A. Tzischevsky, chairman; and the Supreme Council of National Economy of the Union of the Soviet States of Russia, Alexis V. Prigarin, representative. Considerable equipment will be purchased through the Amtorg Trading Corporation, 165 Broadway, New York, official purchasing agent for the Government. Col. Hugh L. Cooper will leave for a trip to the proposed power site and district in the near future.

A project is under consideration at Collie, Australia, for the construction of an electric generating plant to cost in excess of \$1,000,000, for service in the coal-mining district of western Australia and at Bunbury. It is also proposed to construct a large ice and refrigerating plant and fertilizer works. The American Consulate, Melbourne, Australia, Julian B. Foster, assistant trade commissioner, has information regarding the enterprises.

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The Public Works Supplies and Tenders Board, Wellington, New Zealand, is asking bids until Aug. 24 for one synchronous condenser complete with switch gear equipment and accessories.

The Commonwealth Government, Sydney, New South Wales, is considering the construction of a new 15,000-ton floating drydock, with repair facilities, at Newcastle, to cost about \$2,500,000, of which the Government will defray about one-fifth. The project will be carried out as a private enterprise under State direction. The American Consulate, Sydney, Elwood G. Babbitt, trade commissioner, is understood to have information regarding the enterprise.

Hydraulic Steel Reorganization

A reorganization plan for the West Side plant of the Hydraulic Steel Co., Cleveland, has been agreed upon and the receivership will be lifted from this plant, which will be operated as a new company to be known as the Cleveland Welding Co. The plant under the receivership has been operated under its old name, the Cleveland Welding & Mfg. Co. Under the reorganization plans four plant executives, who have operated the plant under the receivership, will have complete control. They are Harry W. Kranz, general manager; Charles S. Holden, sales manager; Jacob S. Fenzel, factory manager, and A. F. Mellman, auditor, all of whom have been with the company many years. Mr. Kranz will be president of the new company. The other officers have not yet been named. The Cleveland Welding Co. will be financed with \$500,000 in bonds, \$1,500,000 in preferred stock and 100,000 shares of no par common stock. Fifty-five per cent of the common stock will be turned over to the four executives above named and will be pooled, the four to exercise full voting power. All the preferred stock and 45 per cent of the common stock will be turned over to a trust company for the security of creditors. The reorganization committee is working on plans to finance and reorganize the East Side plant of the Hydraulic Steel Co. in about the same manner.

Eaton Spring Corporation Expands

Control of the Beans Spring Co., Massillon, Ohio, has been acquired by the Eaton Spring Corporation, a subsidiary of the Eaton Axle & Spring Co., Cleveland, through the purchase of 75 per cent of the stock at \$160 per share. The amount involved in the transaction was \$757,920. The purchase was made by Dan C. Swander, formerly vice-president of the Eaton Axle & Spring Co. It will be financed through the Eaton Spring Corporation, which operates the spring plants of the Eaton Axle & Spring Co., probably through an issue of debentures, and the financial structure of the Eaton company will not be affected. John F. Beans, head of the Beans Spring Co., which he organized six years ago, will be president and general manager of the Eaton Spring Corporation. It is stated that the merger will make this corporation the largest producer of automobile springs in the world and the consumer of from 10,000 to 12,000 tons of steel monthly. The purchase of the plant of the Beans Spring Co., which was handled by Otis & Co., Cleveland investment bankers, has a significance in that it has resulted in the affiliation of another steel-consuming interest with Ohio steel-producing plants. Recently C. S. Eaton of Otis & Co., and associates, acquired the controlling interest in the United Alloy Steel Corporation, Canton, Ohio, and C. S. and J. O. Eaton, the latter also of the Otis firm and chairman of the board of the Eaton Axle & Spring Co., were elected directors of the United company. Previously C. S. Eaton had become chairman of the board of the Trumbull Steel Co., after he and associates had refinanced that company.

The plan of reorganization of the Reed-Prentice Co., Worcester, Mass., has been accepted by the preferred and common stockholders and the company will in future be known as the Reed-Prentice Corporation. The active management has been materially strengthened during the past year by the addition of C. L. Stevens as vice-president, in charge of operations, A. W. Schneider as works manager, and R. C. Blackinton as chief engineer, and the management will retain the services of C. H. Carswell as treasurer and F. W. McIntyre as vice-president, in charge of sales. The board of directors of the new corporation will be identical with that of the old company.

A petition has been filed by William R. and Edith H. Cook for the dissolution of the Michigan Boiler & Iron Works, naming the Michigan Trust Co. temporary receiver, in an appointment made by the Kent County, Michigan, circuit court, May 27. The summary of the assets shows their book value to be approximately \$20,000, with liabilities in the form of accounts and notes payable amounting to \$2,786.55.

THE LAST WORD

(Contributed by the Reader Service Department of The Iron Age Publishing Co.)



NO, gentle reader, this is not an international telephone directory. It is simply the reading pages of a year's issues of THE IRON AGE bound in a single volume. The total number of pages is 3746, exclusive of advertising, containing sufficient material to fill a whole shelf of books.

POPULATION has increased one-sixth since 1913, while manufacturing capacity has expanded one-third. The authority of the Chamber of Commerce of the United States on distribution says that is the reason for the extraordinarily sharp competition existing today.

At first glance it looks logical, but at second glance it seems to be full of holes, like most generalizations. Why should manufacturing capacity be a running mate to population? They simply are not comparable in a great many cases. While the men's shoemaking industry possibly should not get ahead of population growth, this does not apply at all to the manufacture of gasoline, vacuum cleaners, stockings, building brick, or toothpaste.

The fortunes of individual industries are decided by chance, public whim or favor, prosperity, selling ability—to name a few of the factors that are as potent as a high birthrate.



STEEL COMMON established a new "top" a few days ago, touching 139¾. Wall Street apparently looks for good business in steel during the second half of the year.

EDITORS, advertising men and circulation salesmen must keep themselves in the limelight to earn their bread and butter. But do they make up the entire IRON AGE organization? No, sir! There are many silent workers behind the scene with whom you never come into contact, unless something goes wrong.

Take our postal expert, for example. You wouldn't know we had one, if everything always went along smoothly. But just as soon as there is a delay in delivery, he is at work instantly, straightening out the kink.

He will regard it as a favor if you will drop him a line whenever your copies arrive late. Just address Postal Expert, THE IRON AGE, 239 West Thirty-ninth Street, New York.

Every copy of THE IRON AGE is carefully routed via mail trains which will carry it to its destination the fastest, and although we get the finest kind of co-operation from the Post Office Department, delays will occur once in a while. And that is when the man who looks after deliveries demonstrates that his title fits him.

A. H. D.



ELEPHANT BRAND

REG.U.S.



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“Phosphor Bronze”



ELEPHANT BRAND PHOSPHOR BRONZE “S” BEARING METAL BUSHINGS CAST IN THE ROUGH
170 Sizes Carried in Stock for Immediate Delivery
QUALITY IS THE BEST ASSURANCE OF SATISFACTION

Solids Lbs.	Length	Outside Diameter	SIZE OF CORES																		
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.				
3½	12"	1"	½"	2½"																	
4	12"	1¼"	¾"	2¾"	½"	3¼"															
4½	12"	1½"	¾"	3"	¾"	3½"	½"	4"													
6½	12"	1¾"	¾"	4"	¾"	4¾"	¾"	5"	½"	5½"											
7¼	12"	1½"	1"	4¼"	7⁄8"	5"	¾"	5¾"	¾"	6"	½"	6½"									
8½	12"	1¾"	1½"	4¾"	1"	5½"	7⁄8"	6¼"	¾"	6¾"	¾"	7¼"									
9¾	12"	1¾"	1½"	5½"	1½"	6"	1"	6¾"	7⁄8"	7¼"	¾"	8"	5⁄8"	8½"							
11	12"	1¾"		1¾"	6½"	1½"	7½"	1"	8"	7⁄8"	8¾"	¾"	9"	5⁄8"	9¾"						
13	12"	2"		1¾"	7¼"	1½"	8¼"	1½"	9"	1"	9¾"	7⁄8"	10"	¾"	11"						
14¼	12"	2¼"		1½"	7½"	1½"	8½"	1½"	9½"	1½"	10"	1"	11"	¾"	11¾"	¾"	12½"				
15½	12"	2¼"		1½"	7¾"	1½"	8¾"	1½"	9¾"	1½"	10¾"	1½"	11¾"	1"	12½"	¾"	13"				
17	12"	2¾"			1½"	9½"	1½"	10½"	1½"	11½"	1½"	12½"	1½"	13½"	1"	14"					
19	12"	2½"			1¾"	10"	1½"	10¾"	1½"	12½"	1½"	13½"	1½"	14¼"	1½"	15"					
21	12"	2¾"				1¾"	12"	1½"	12¾"	1½"	14"	1½"	15½"	1½"	16½"						
23	12"	2¾"				1½"	12½"	1¾"	14"	1½"	14½"	1½"	16"	1½"	17"						
25¼	12"	2¾"						1½"	14½"	1¾"	15½"	1½"	17¾"	1½"	18¾"						
28½	12"	3"						2"	16¼"	1¾"	17¼"	1¾"	19"	1½"	19½"	1½"	21"	1½"	22"		
32¼	12"	3¼"						2¼"	17½"	2½"	18¾"	2"	20¼"	1½"	21½"	1¾"	23¼"	1½"	24"		
38¼	12"	3½"						2½"	19½"	2½"	20¼"	2¼"	21¾"	2½"	22½"	2"	25¼"	1½"	27"	1½"	28¾"
43	12"	3¾"						2¾"	20¼"	2½"	21½"	2½"	24¼"	2½"	25½"	2¼"	27¾"	2½"	29½"	2"	31"
49¼	12"	4"						3"	23¼"	2½"	25½"	2¾"	27¼"	2½"	28¾"	2½"	30¾"	2½"	31½"	2¼"	33¾"
	12"	4¼"						3¼"	24¼"			3"	28¾"	2½"	29¾"	2¾"	31¾"	2½"	33¾"	2½"	36¾"
	12"	4½"										3¼"	31½"		3"	35"	2½"	34"	2¾"	38½"	
	12"	4¾"										3½"	32¼"		3¼"	35½"		3"	39"	2¾"	45¼"
	12"	5"										3¾"	33"		3½"	39¾"		3¾"	43"	3"	49¾"
	12"	5¼"										4"	35"		3¾"	42"		3½"	46"	3¼"	51¼"
	12"	5½"										4¼"	38¾"		4"	42¾"		3¾"	48"	3½"	54¾"
	12"	5¾"										4½"	40¼"		4¼"	43¼"		4"	52½"	3¾"	56"
	12"	6"										4¾"	42½"		4½"	46½"		4¼"	53½"	4"	56¼"
		Thickness of Walls	¼"	⅝"	¾"	⅞"		½"		⅞"	¾"		1"		¾"		1"		¾"	1"	

SOLIDS
½"to 4" dia's
CARRIED IN
STOCK

SOLIDS
1/2" to 4" dia's
CARRIED IN
STOCK

ALL
12" LONG

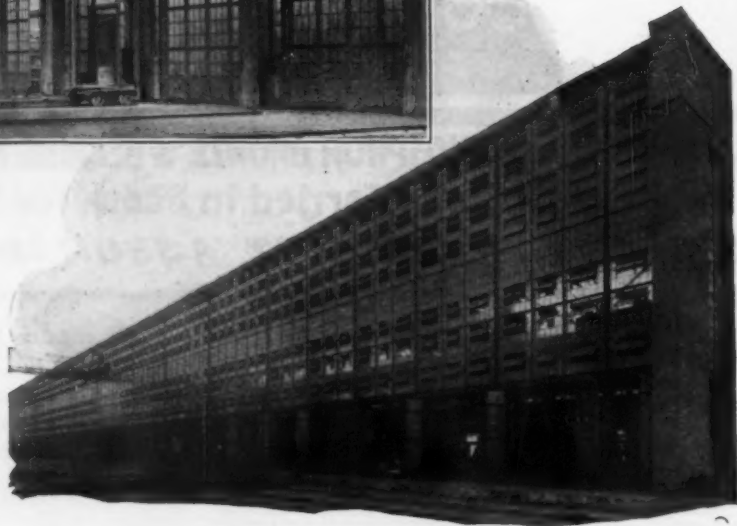
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2200 WASHINGTON AVENUE, PHILADELPHIA, PA.



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here to quickly
find what
you are
looking for



Then turn
the page and
look up here
for the
section numbers



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THESE LISTINGS BROADLY COVER THE PRODUCTS ADVERTISED IN THIS ISSUE.
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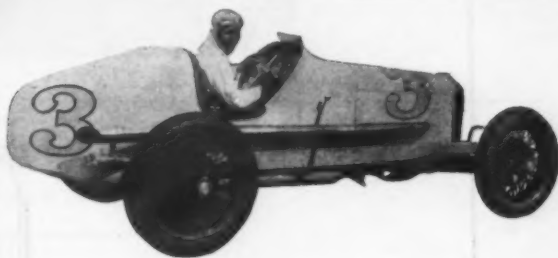
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<i>Steering knuckles</i>	<i>Drive shafts</i>
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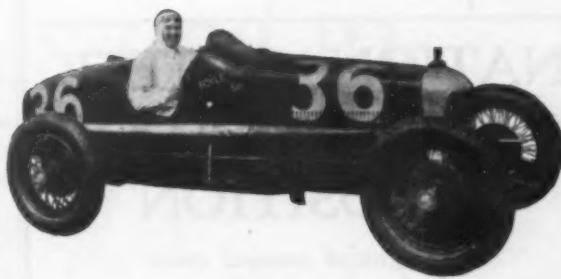
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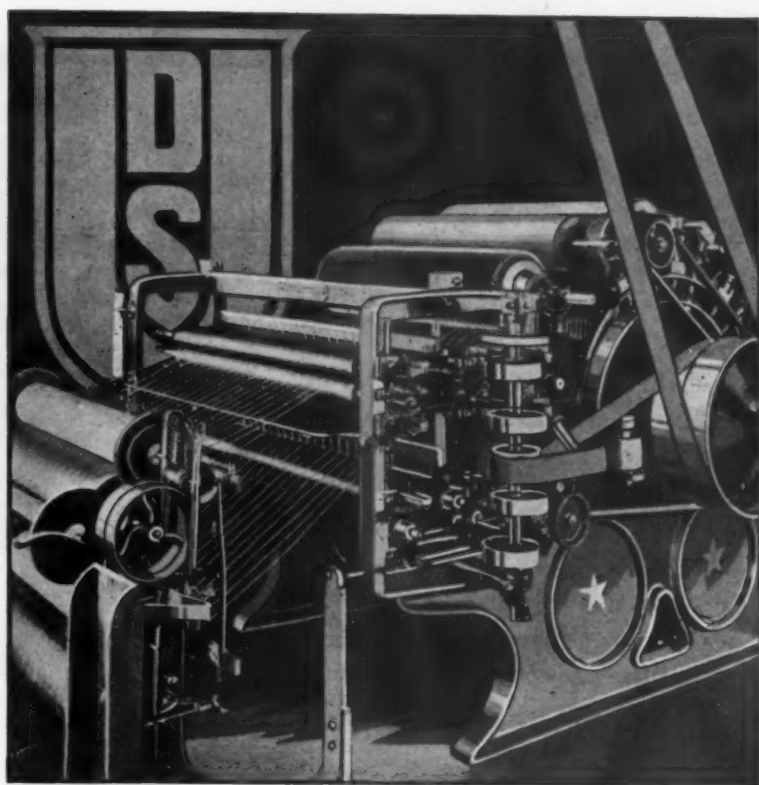
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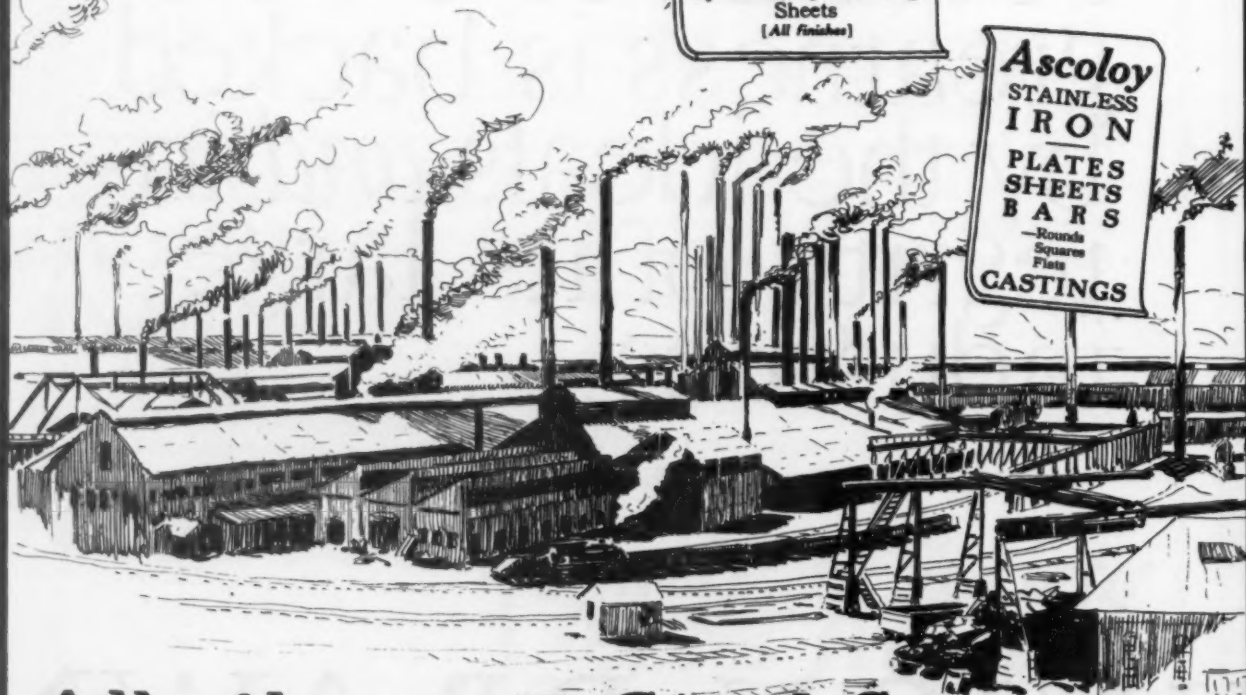
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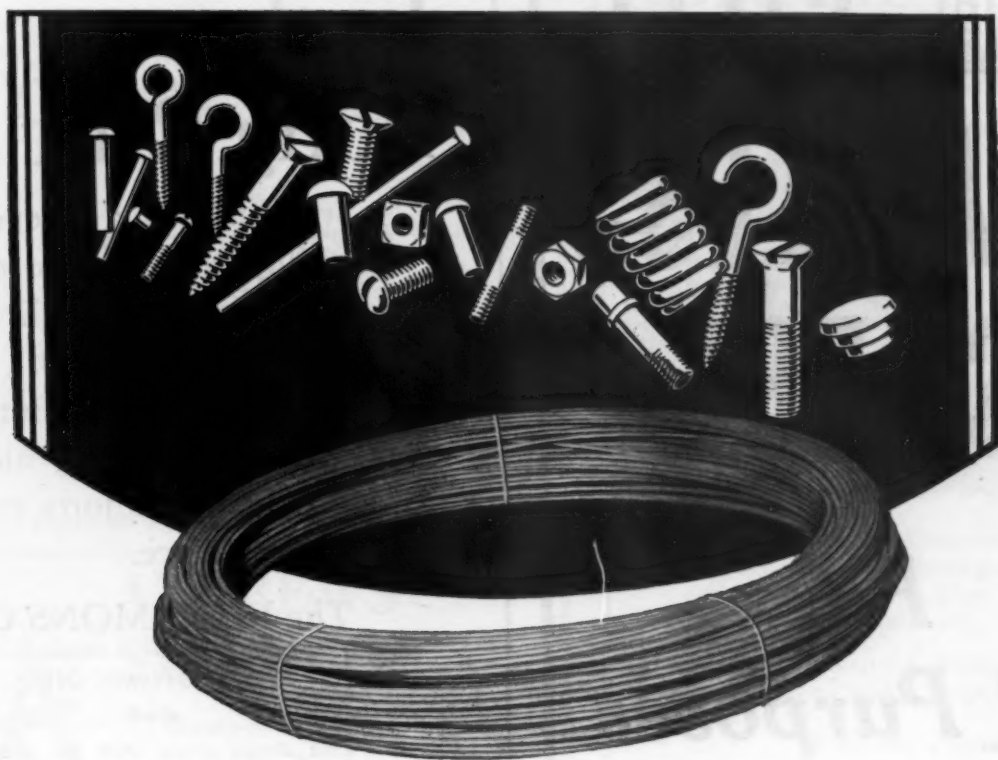
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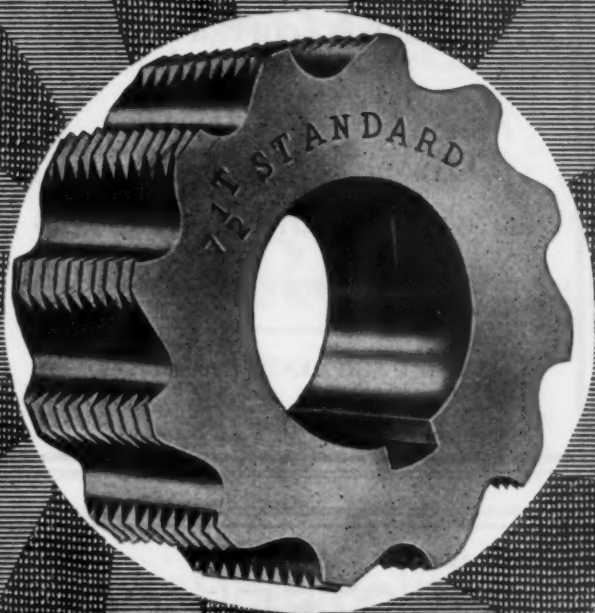
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Now, stop and consider, if Wolfram could make such a showing in this plant, can you afford to pass it up without a trial?

VULCAN CRUCIBLE STEEL CO.

Established 1900

HOME OFFICE AND WORKS: ALIQUIPPA, PA.

Branches:

CHICAGO: 16-18 South Clinton St.
 ST. LOUIS: 823 Wainwright Bldg.

PHILADELPHIA: 512 Commerce St.
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New England Representative:
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**EDGAR ALLEN
HIGH SPEED
AND SPECIAL STEELS**

Sheffield Tool Steels are as good as you can get. Use them.

EDGAR ALLEN STEEL CO., Inc.
722 W. Lake St., Chicago 194 Front St., N.Y.

To keep on growing, keep on learning. To keep on learning, read your business paper carefully each week.

Rolled Steel "**NEVERSLIP**" Floor Plates



RAISED DIAMOND
Diamond and Ribbed Pattern

AMERICAN PRESSED STEEL CO.
PHILADELPHIA, PA.
The Original Diamond Pattern Plate

Newport Rolling Mill Co.

Newport, Kentucky, U. S. A.

MANUFACTURERS OF
**BLACK AND
GALVANIZED STEEL**

AND

**"GENUINE OPEN
HEARTH IRON"**

PURE IRON—COPPER ALLOY
RUST RESISTING

**SHEETS AND
FORMED PRODUCTS**

ALL GAUGES, WIDTHS AND LENGTHS

SEND US YOUR INQUIRIES

PROMPT SHIPMENTS GUARANTEED

1826 — One Hundred Years — 1926

ALAN WOOD IRON AND STEEL CO.

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SHEARED PLATES

SHEET STEEL

MANUFACTURERS

Deep Drawing and
Extra Deep Drawing Qualities

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ALLOY STEEL PLATES
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FOR ALL
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PURPOSES



NEWTON STEEL CO.
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14

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SHEETS — BARS — PLATES — PIPE — PIG IRON
FORMED ROOFING PRODUCTS



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General Offices: REPUBLIC BLDG., YOUNGSTOWN, O.

SHARON STEEL HOOP COMPANY

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 SHARON, PA. YOUNGSTOWN, O. LOWELLVILLE, O.


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• FULL COLD ROLLED

COPPER BEARING

DOUBLE SEAMING

HEAT TREATED

SHEETS

STRIPS

DEEP DRAWING STOCK

COLD ROLLING STOCK

BLACK—PICKLED—GALVANIZED—COPPER BEARING

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 BLUE ANNEALED
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TIN PLATE

 COKES
 "A" CHARCOAL
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 KANNERS SPECIAL
 SILVER FINISH
 LACQUERED
 TERNE PLATE
 BLACK PLATE
 UNIFORM COLOR BLUED STOVE PIPE STOCK
 UNIFORM COLOR BLUED ELBOW STOCK
 ENAMELING STOCK
 FULL FINISH BLACK PLATE

STRIP STEEL

 HOT ROLLED
 COLD ROLLED
 FENDER STEEL

 WE CONTROL EVERY PROCESS IN THE MANUFACTURE
 OF THESE PRODUCTS—FROM IRON ORE TO FINISHED
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SHEET STEEL
 TRADE EXTENSION COMMITTEE

ECONOMY

COURTESY

ANOTHER SHEET STEEL SERVICE



Expanded metal lock gives plaster a steel base that protects it against cracks, insect-work and the ravages of fire. Cautious because it endures.

Shaped
in Steel

*This Modern Kitchen
does Save Steps*

Sheet Steel
Cupboard

reduces polishing
of work. The
heat resists
all per-
tubs
ce.

Creating Business for Every Product Shaped in Steel

This is one of the current advertisements in the SHEET STEEL TRADE EXTENSION CAMPAIGN. It is typical of similar educational messages appearing in 34 leading magazines which have a total circulation of more than 10,000,000.

These advertisements do more than sell the particular products featured, for they are stimulating public interest in all of the many advantages inherent in Sheet Steel—its strength, its safety, its fire resistance, its economy, and durable beauty.

Every manufacturer of a product shaped in steel can take advantage of this awakened public interest by featuring the fact that his is a Sheet Steel product. He can make the qualities inherent in Sheet Steel bring him added sales and added profits.

Manufacturers can receive copies of these advertisements together with complete information concerning the campaign by addressing the SHEET STEEL TRADE EXTENSION COMMITTEE, OLIVER BUILDING, PITTSBURGH, PA.

SHEET STEEL
FOR SERVICE

*Sheet Steel
Saves Steps
in Business too*



This trade-mark stenciled on galvanized Sheet Steel is definite insurance to the buyer that every sheet so branded is of prime quality—full weight for the gauge stamped on the sheet—never less than 28 gauge—and that the galvanizing is of the full weight and quality established by the SHEET STEEL TRADE EXTENSION COMMITTEE specification.

COLD ROLLED STRIP



**BEST QUALITY
FOR STAMPING AND
DEEP DRAWING**

Superior Finish

THE uniform quality of **GRIFFIN COLD ROLLED STRIP STEEL** in the wide range of sizes from $\frac{1}{2}$ " to 19" in width, gauges .002 to .500, in special tempers for the forming desired, developed through years of experience in rolling and manufacture, insures **SERVICE** that can be depended on for your particular requirements in high class stamping work.

**GRIFFIN
MANUFACTURING
CO.**

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ERIE, PENNA.

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Peter A. Frasso & Co.
Incorporated
Grand & Sullivan Sts.
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Philadelphia—Warehouse
Winchikson & Hunting
Park Aves.

Boston—Warehouse
H. D. Evans Steel Co.
127 Oliver St.

Buffalo
Charles T. Neale
203 White Bldg.

Chicago—Warehouse
The Central Steel & Wire Co.
4545 So. Western Blvd.

Detroit—Warehouse
Bellevue & Warren Aves.

Cleveland—Warehouse
The Patterson-Lottish Co.
800 E. 69th St.

Detroit
F. Walter Gulbert
328 Ford Building



Generous Coating

Inland Steel Sheets take and hold tenaciously an unusually generous coating. Not chance—they are made so they will. There is no sparing of the spelter. No wonder they last so long.

INLAND
BASIC OPEN HEARTH
STEEL SHEETS

INLAND STEEL COMPANY

38 South Dearborn Street, Chicago

Branch Offices: Milwaukee, St. Paul, St. Louis, Kansas City, Mo.
Mills: Indiana Harbor, Ind., Chicago Heights, Ill., Milwaukee, Wis.



Standard in Quality—Reliable in Service!

**Black and Galvanized
SHEETS**
TIN AND TERNE PLATES

We manufacture SHEET AND TIN MILL PRODUCTS for all purposes—American Bessemer, and American Open Hearth Steel Sheets, Keystone Copper Steel rust-resisting Sheets, Apollo Galvanized Sheets, Formed Roofing and Siding Products, Culvert and Flume Stock. Sheets for Special Purposes, Roofing Tin Plates, Light Tin Plate, Black Plate, Etc.

AMERICAN SHEET AND TIN PLATE COMPANY, Frick Bldg., Pittsburgh, Pa.
Send for booklets and weight cards. Watch for our large advertisements.

**COLD ROLLED
STRIP STEEL**
Quality—Service—Accuracy
THE HIND STEEL CO., Inc.

Office and Mill:
UNION, UNION COUNTY, NEW JERSEY

Superior

**HOT and COLD ROLLED
STRIP STEEL**

Superior Steel Corporation

Union Trust Bldg.

Pittsburgh, Pa.

STRIP STEEL

A Dependable Source of Supply

with an Organization equipped to satisfy the requirements of the most exacting user of

Hot Rolled Strip Steel

Cold Rolled Strip Steel

WEST LEECHBURG STEEL COMPANY

Gen. Sales Offices Works
PITTSBURGH, PA. LEECHBURG, PA.

Sales Offices
NEW YORK CHICAGO
DETROIT TOLEDO
CINCINNATI
921 Union Central Bldg.

SHIM STEEL

CARRIED IN STOCK

Cold Rolled Strip, Spring and Tool Steels
Widths $\frac{3}{8}$ " to 16". Thickness 0015 to $\frac{3}{8}$ "

PITTSBURGH COLD ROLLED STEEL CO.

Verona, Pa.

Detroit
Thos. F. Thornton
2995 Hubbard Ave.

New York
Coppered Strip Steel Co.
Eastern Representative

Chicago
H. S. Gillett
549 Washington Blvd.

Youngstown
A. H. Dillon
Stambaugh Bldg.

The TRUMBULL STEEL CO.

Manufacturers of

HOT and COLD ROLLED STRIP

Electrical Blue Annealed, Black and Galvanized Sheets
Tin Mill Black ~ Tin Plate ~ Long and Short Ternes

WARREN

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OHIO

HOT AND COLD ROLLED
STRIP STEEL
Largest hoop rolling mill & longest lengths in the world
ACME STEEL CO. CHICAGO

ATASCO
STRIP STEEL
HOT OR COLD ROLLED
The American Tube & Stamping Co.
Bridgeport, Conn.

COLD ROLLED STRIP STEEL

UNEXCELLED FOR ACCURACY TO GAUGE, FINE FINISH AND DRAWING QUALITY

MORRIS & BAILEY DIVISION

OLIVER IRON AND STEEL CORPORATION, PITTSBURGH, PA.

HIGH GRADE STRIP STEEL

STAMPING AND DEEP DRAWING
UNIFORM IN QUALITY

Control of the Quality begins with the manufacture of the steel in our own Open Hearth and continues through all subsequent processes

LACLEDE STEEL CO.

ST. LOUIS

Steel Works & Rolling Mills, Alton, Ill.

OFFICES:
Detroit—Chicago—St. Louis—Kansas City

Silvery Pig Iron (Silicon 6% to 10%)
Bessemer Ferro Silicon (Si 10-20%)
50% Ferro Silicon 90%

Southern Ferro Alloys Company
Chattanooga, Tenn.

The Stewart Furnace Company

Union Trust Bldg., Cleveland, Ohio

Manufacturers of

Low Phos. and Bess. Pig Iron

Furnace at Sharon, Pa.

For Complete Information,
write

THE STANLEY WORKS
New Britain, Conn.

STANLEY STRIP STEEL

Hot and Cold Rolled
for Stamping, Forming
and Deep Drawing



PILLING & COMPANY, INC.

PIG IRON, IRON ORES, ALLOYS, COAL, COKE

11 Broadway, New York

1500 Chestnut Street, Philadelphia

80 Federal Street, Boston

PIG IRON · ORES · ALLOYS · COAL · COKE · BY~PRODUCTS

QUALITY AND SERVICE
E. ARTHUR TUTEIN
INCORPORATED
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HUDSON VALLEY COKE & PRODUCTS CORP.
Sales Agents for
Foundry Malleable Forge Basic } Pig Iron · Sulphate Ammonia · Benzol · Tar Products · Coke { Furnace Pounding Domestic

CLEVELAND-CLIFFS



Established 1850

**MARQUETTE—MENOMINEE
and MESABA RANGE ORES**

LUMP ORES for Open Hearth Use

**PIG IRON—FERRO ALLOYS
COAL—COKE**

THE CLEVELAND-CLIFFS IRON CO.
CLEVELAND, OHIO

Hillman Coal & Coke Company

First National Bank Building, Pittsburgh, Pa.

Standard Low Sulphur Connellsville Coke

for Blast Furnaces and Foundries

SHIPMENTS 3,000,000 TONS ANNUALLY

Daily Shipments 10,000 Tons. Any Railroad Delivery.

WALDO, EGBERT & McCLAIN

Incorporated

**Pig Iron, Coke, Coal
Alloys, Steel, Fuel, Oil**

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BOSTON, MASS.

PARK & WILLIAMS, Inc.

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Real Estate Trust Bldg.

**SWED PIG IRON
SWEDISH IRON ORE**

IRON ORES

All Grades, Particularly
**CUYUNA RANGE
MANGANIFEROUS**

JOHN A. SAVAGE & CO.
Duluth, Minnesota



for

**COKE
PIG IRON
FERRO-MANGANESE**

**Ferro-Phosphorus
Ferro-Silicon
Spiegeleisen
Fluor Spar
Aluminum**

Smithing
Coal

Ores

Molding
Sand

21 East 40th St., New York, N. Y.

Cincinnati
Buffalo

Philadelphia
Boston

Pittsburgh
Cleveland

Chicago
St. Louis

COAL



*Fifteen Million
Tons Annually
by Rail and Lake*

Trade Mark
Registered

THE NORTH AMERICAN COAL CORPORATION

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Pittsburgh, Pa.
Wabash Bldg.

Toledo, Ohio
Second National Bank Bldg.

New York, N. Y.
No. 1 Broadway

Akron, Ohio
Second National Bank Bldg.

Buffalo, N. Y.
Prudential Bldg.

Pittsburgh Terminal Youghiogheny Gas
Logan County, W. Va., Gas and By-Product

Atwater Pocahontas

Pittsburgh Steam

Pittsburgh No. 8

Powhatan

W. P. Snyder & Co.

ESTABLISHED 1888

Pittsburgh, Pa.

Iron Ore
Pig Iron
Coal—Coke

The Shenango Furnace Co.

FIRE BRICK

USRCO

FIRE BRICK
FIRE CLAY

Mt U

SILICA BRICK
SILICA CEMENT

Write for prices

UNITED STATES REFRACTORIES CORP.

Mount Union

Pennsylvania

PITTSBURGH OFFICE, 840 OLIVER BLDG.

WALSH FIRE BRICK

FROM COAST TO COAST

WALSH FIRE CLAY PRODUCTS CO.

ST. LOUIS

CHICAGO

260 N. MICH. ST.

NEW YORK

220 FIFTH AVE.

VALENTINE FIREBRICK

M. D. Valentine & Bro. Co.
WOODBIDGE, N. J.

PITTSBURGH COAL CO.

PITTSBURGH, PA.

*The Largest Commercial Producers
of BITUMINOUS COAL ~
GAS COAL - STEAM COAL - BY-PRODUCT COAL - DOMESTIC COAL
RAIL OR LAKE SHIPMENTS -
Sales Offices in all the Principal Cities.*

The Chas. Taylor Sons Co.

Manufacturers of

TAYCO—The Famous HIGH TEMPERA-
TURE FIRE BRICK—a special refractory.
Fire Clay Brick for All Needs.

Gen'l Offices: Cincinnati Mines: Olive Hill, Ky.

FIRE BRICK

High Grade Dry Press Fire Brick
Standard Stiff Mud Brick

All Kinds of Fire Clay Tile

Plastic Fire Brick and Fire Clay Cement

ST. LOUIS VITRIFIED & FIRE BRICK CO

306 Wainwright Bldg.

St. Louis, Mo.

Get rid of weak joints



In furnaces, heat attacks the joints—then the whole lining gives way. Pilbrico Furnace Lining eliminates joints. It's plastic; pound it in with mallet and trowel. It outlasts firebrick 2 to 4 times. Withstands 3100 deg. F. For boiler and industrial furnaces. Ask for "Refractories and Furnace Design"—32 pages.

Pilbrico Jointless Firebrick Co.
1166 Clay Street, Chicago



WHEN carbon from your fuel replaces the iron oxide present in most fire brick, you can't avoid a cracked, shattered or crumbled condition that requires expensive repairs.

We don't claim that Ashland Brick will not disintegrate, but we have been in business 40 years, and we have yet to find any Ashland user who has been forced to reline for that reason.

To avoid premature failure and loss of production time, use Ashland—the brick that lasts. The various Ashland brands are made exclusively of highly refractory Kentucky fire clays containing less than 5% of fluxing elements.

ASHLAND FIRE BRICK CO.

Incorporated

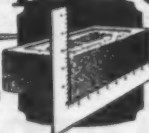
1886

ASHLAND,

KENTUCKY

Manufacturers

Of Sized Brick



110 East 42nd St., New York City
29 So. La Salle St., Chicago, Ill.
1252 E. 55th St., Cleveland, O.

3rd and Larned Sts., Detroit, Mich.
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These Refractory Advantages Can Be Yours

THERE are some very real advantages in buying refractories from an organization offering as complete a refractory service as that rendered by the General Refractories Company.

You can get just the right refractories for your particular service conditions. General Refractories Company produces every kind and shape of fire clay, silica, chrome, magnesite and high alumina brick, in every standard and any special shape, and by all refractory processes.

You can be sure not only of the right refractory for your purpose, but prompt and dependable shipment. The fifteen plants of the General Refractories Company have a capacity of 1,000,000 brick per day.



Send for a copy
of the General Re-
fractories Catalog.

If you have no immediate refractory requirements, write for a General Refractories catalog and put this page aside as a reminder.

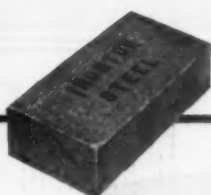
GENERAL REFRACTORIES COMPANY

117 South 16th Street, Philadelphia, Pa.

District Offices—Boston Buffalo Chicago Cleveland Detroit Indianapolis New York Pittsburgh
Pacific Coast Representative—Richard S. Jensen Co., Los Angeles, California
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IRONTON FIRE BRICK



Ironton "Steel" and Ironton "Peerless" have a record on high duty service second to none. Our Kentucky flint clays fuse at 3254° F., Softening point, cone 33.

Write for data on tests and names of users.

Made from the famous Olive Hill, Ky. clays

Mines BRADMYER, KY. (Olive Hill, Ky. District)

THE IRONTON FIRE BRICK CO. 7-3'd St. IRONTON, O

CRESCENT REFRACTORIES COMPANY

FIRE CLAY BRICK AND DUST
REFRACTORY CEMENTS

CURWENSVILLE, PENNA.



ALUMINOTHERMIC METALS AND ALLOYS

25% Ferro-Titanium; many others. Write for pamphlet No. 2030.

METAL & THERMIT CORPORATION

120 Broadway, New York

Pittsburgh Chicago Boston S. San Francisco Toronto

Inica Schist

Block or sand for patching and lining cupolas, converters, soaking pits, ladles and industrial furnaces.

EDGE HILL SILICA ROCK CO., New Brunswick, N.J.

1836 QUEEN'S RUN 1926

Have been on the Market for
90 — NINETY YEARS — 90

Let us assist on your Fire Brick needs

QUEEN'S RUN REFRACTORIES CO., Inc.
LOCK HAVEN, PA.

15 Park Row New York 401 Harrison Bldg. Philadelphia 141 Milk St. Boston

Frank Samuel S. M. Tomlinson S. A. Cochran

FRANK SAMUEL & CO.

Harrison Bldg., Philadelphia, Pa.

80% Ferro-Manganese	Pig Iron	Muck Bars
DINSDALE	Low Phos	Low Phos
	English	American
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Manganese Ore	Iron	Chrome Ore
Open Hearth Use	Ores	Lump
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Branch Offices:

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Reg.
U. S. Pat.
Off.

THERMOLITH

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The All-Temperature Fire Cement

"Makes the Weakest Point the Strongest"

Write for Literature.

HARBISON-WALKER REFRACTORIES CO.
World's Largest Producers of Refractories
Pittsburgh, Pa. U.S.A.

(German) Standard 78-82%

FERRO-MANGANESE

Immediate shipment from (Baltimore) stocks

CHARLES HARDY, Inc.
100 E. 42nd St., New York City

The Stowe-Fuller Refractories Co.

FIRE BRICK
Manufacturers

Fire Clay, Silica, Magnesite and Chrome Brick

Ground Fire Clay—Silica, Magnesite and Chrome Cements
1650 UNION TRUST BLDG. CLEVELAND, OHIO

Walter-Wallingford & Co.

50% Ferro Silicoon
Ferro Manganese
Chrome Ore
Pig Iron

20% to 25%
Ferro Phosphorus
Spiegeleisen
Iron Ore
Coke

CINCINNATI PITTSBURGH CHICAGO



Brick-Block-Powder-Cement -
for all High Temperature
Equipment ~

SIL-O-CEL HEAT INSULATION

Write for
Engineering Data-
CELITE PRODUCTS CO.

11 Broadway, NEW YORK; 1320 S. Hope St. LOS ANGELES

"Carlton"

Brand

FERRO MANGANESE

C. W. LEAVITT & COMPANY

SOLE AGENTS

30 Church Street

New York

BUY DIRECTLY FROM THE MANUFACTURER FERRO-MANGANESE — REFRACTORIES

E. J. LAVINO AND COMPANY

CHICAGO
298 SO. LA SALLE ST.

PHILADELPHIA
BULLITT BUILDING

PITTSBURGH
OLIVER BUILDING



The Titanium Alloy Manufacturing Co.

Niagara Falls, N. Y., U. S. A.

BRANCH OFFICES:

94 FULTON ST., NEW YORK
OLIVER BUILDING, PITTSBURGH
6007 EUCLID AVE., CLEVELAND



AGENTS FOR
GREAT BRITAIN and EUROPE

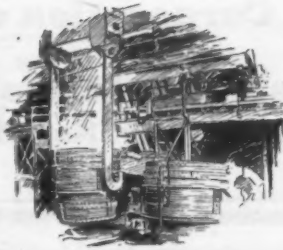
T. ROWLANDS & CO., LTD.
SHEFFIELD, ENG.

Shock Resisting Steel

INCLUSIONS that would cause shock and fatigue failures can be eliminated from carbon and alloy steels by treatment with zirconium.

Try zirconium for high pressure castings and spring steel where extreme cleanliness is required as a guarantee against failures due to shock and fatigue.

ELECTROMET zirconium ferrosilicon is an electric furnace product low in im-



purities. Typical analysis:

Zirconium.....9% to 12%
Silicon.....40% to 47%
Iron.....40% to 45%
Carbon..Maximum 0.20%

ELECTROMET service, which is back of all ELECTROMET alloys, means prompt shipment of your orders from stock and the help of our metallurgical staff when you need it.

Write for our new booklet on the properties and uses of ELECTROMET alloys.

Sole Distributors

ELECTRO METALLURGICAL SALES CORPORATION

Carbide and Carbon Building, 30 E. 42d St., New York

Electromet E Brand *Ferro-Alloys and Metals*

CHROMIUM

High Carbon Ferrochrome
(maximum 6% carbon)
Low Carbon Ferrochrome
(in grades, maximum
0.10% to maximum
2.00% carbon)
Chromium Metal
Chromium Copper
Miscellaneous Chromium
Alloys

MANGANESE

Standard Ferromanganese
78 to 82%
Low Carbon Ferromanga-
nese
Manganese Metal
Manganese-Silicon
Manganese-Copper
Miscellaneous Manganese
Alloys

SILICON

Ferrosilicon 15%
Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon (minimum
97% silicon)
Calcium-Silicon
Silicon-Copper

Manganese-Silicon
Silico-Manganese
Miscellaneous Silicon
Alloys

ZIRCONIUM

Silicon-Zirconium
Nickel Zirconium
Zirconium-Ferrosilicon

FERRO ALLOYS

**Vanadium
Chrome
Tungsten**

**Silicon
Silico-Manganese
Molybdenum**

Vanadium Corporation of America

and

United States Ferro Alloys Corporation

**Works:
Bridgeville, Pa.**

120 Broadway, New York

**Works:
Niagara Falls, N. Y.**



**Ferro Silicon
SILVERY IRON
BESS'R FERRO SILICON
KEOKUK ELECTRO-METALS CO.**

Furnaces and General Offices: Keokuk, Iowa



Temper the Charge

with "PITTSBURGH" Ferro Silicon

Bessemer-50%-75%

Pittsburgh Metallurgical Company

Main Office: Niagara Falls, N.Y.

BRASS

Rods—Pipe—Tubing—Strip

WILLIAMS & CO., INC.

Main Office and Warehouse

911 PENNSYLVANIA AVE., N. S.

PITTSBURGH, PA.

SEE PAGE

**facing last page of
Alphabetical Index**

ESTABLISHED 1802
SCOVILL
MANUFACTURING COMPANY

**Are You
Reading the
Scovill Pages?
On Brass**

Once a month
Just before Editorial contents

SHOT



INGOT

The Ideal Nickel for All Purposes

UNITED STATES NICKEL CO.
NEW BRUNSWICK, N. J.

copper, brass and bronze

For complete, authoritative
information and literature
on the uses of these metals

write

COPPER & BRASS
RESEARCH ASSOCIATION
25 Broadway, New York

SEYMOUR PRODUCTS

HIGHEST



QUALITY

Trade Mark

PHOSPHOR BRONZE


**COMMERCIAL AND SPECIAL BRONZES
BRASS—GILDING—PRELIDE
INGOTS—SHEETS—RODS
WIRE—BLANKS—SPECIAL STAMPINGS**

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
ESTABLISHED 1878

AMERICAN NICKEL CORPORATION
CLEARFIELD, PENNA.

MOND 70 AMERICAN 99

AN EXACT ALLOY PURE, FREE FROM COBALT



PLATINUM WARE
MADE TO U. S. STANDARD

BAKER Platinum crucibles and dishes all conform to the purity specifications recommended by the United States Bureau of Standards. No higher type of laboratory ware can be found.

BAKER & CO., INC.
54 Austin St. Newark, N. J.
We buy Platinum Scrap

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The Chrome Alloy Plate

CHEMICAL TREATMENT COMPANY, Inc.
26 Broadway New York

HIGH QUALITY MACHINE FORGINGS
All Kinds in Any Quantity
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THE MACHINERY FORGING CO.
CLEVELAND, OHIO

MAGNOLIA
ANTI-FRICTION
METAL

REGISTERED U. S. PATENT OFFICE
MAGNOLIA METAL CO. 115 E. 12TH ST. NEW YORK

ANACONDA
99.90% Electrolytic
PURE Zinc

SELLING AGENTS
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FORGED STEEL
CRANKSHAFTS
AND
CONNECTING RODS
Rough Machined or Finished
Machine and Woodruff Keys
Forgings of all Kinds

THE WILLIAM LEARD CO., Inc.
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ROLLED ZINC STRIP OR RIBBON

Long lengths in coils for automatic feeding to Presses for Stamping

Superior quality for Drawing, Spinning, Forming.
Discs and Shapes cut to size and form

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ZINC

COLD ROLLED, COILS AND STRIPS
FOR STAMPING AND DRAWING
ZINC STRIP FOR ELECTRIC FUSES

Also Manufacturers of EYELETS

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TIOGA
FORGINGS


Hammered or pressed, smooth forged, rough turned, finished machined and treated.

Open hearth, Carbon or Alloy Steel.

The Tioga Steel & Iron Co.
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Conklin
NON-FERROUS SERVICE

TECCO BRAND



Brass, bronze, and copper (in all shapes) are not perishable products like fruits, but you would think so if you could see how quickly we rush every order to our customers. Often less than 24 hour service. This illustrates the dispatch of Conklin Service in Non-Ferrous Metals.

Call Walker 7500

T. E. Conklin Brass and Copper Co., Inc.
54 Lafayette St. New York, N. Y.
Established 1860

VULCAN FORGINGS

Light and Medium Weight High Grade Forgings made of Crucible Tool Steels, Alloyed Steels, Open Hearth Machinery Steels

DIEMAKERS FORGINGS, GEAR BLANKS, CRANKSHAFTS, PISTON RODS, LEVERS, ROLLS, SPINDLES, RINGS and SHAPED WORK

VULCAN STEAM FORGING CO.
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STEEL AND IRON FORGINGS

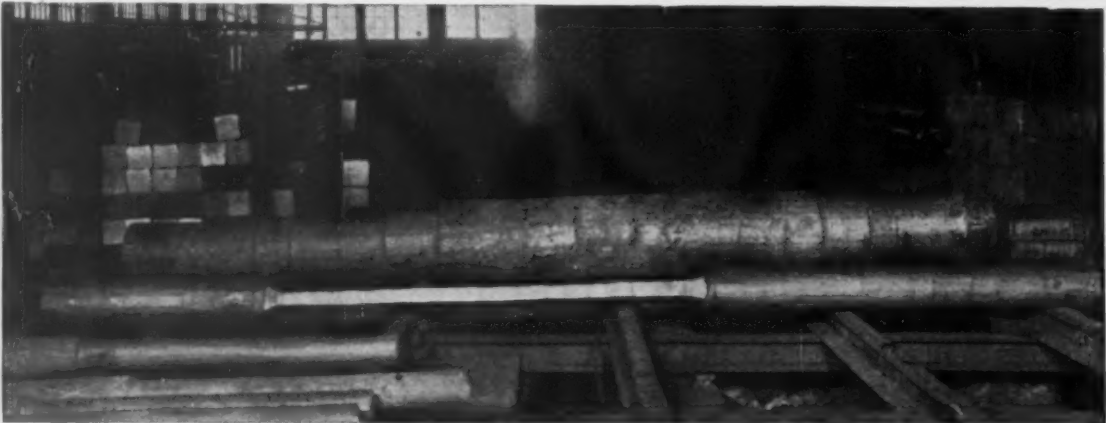
SHAFTS ~ RINGS ~ GEAR BLANKS ~ MISCELLANEOUS SHAPES

Forged
CHROME STEEL CRUSHER BALLS
All Sizes

Forged Steel
PIPE FLANGES
High Hub - Low Hub - Reducing - Welding

Shipments From Stock

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1008 COMMERCIAL TRUST BUILDING
Works: 33rd and Grays Ferry Ave. PHILADELPHIA, PA.



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CANN & SAUL STEEL CO.

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NATIONAL FORGINGS

Why shop around when these meet your every requirement at bedrock costs?

Crank shafts, eccentric shafts, connecting rods, rams and columns for presses, blanks for pinions and worm gears.

Special work to your order.



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FORGINGS DIE BLOCKS SHEAR KNIVES

Heppenstall Forge & Knife Co.
WORKS

Pittsburgh Bridgeport
Offices in Principal Cities

Bethlehem Forgings and Castings



Rough Turning Hollow Forged Reaction Chamber

Forgings of Every Type and Size

We are admirably equipped to make forgings of every type and size. With our own mines, blast furnaces, open-hearths, rolling mills and machine shops we are independent of outside sources for our steel supply, and are therefore in a position to control quality, analysis and workmanship.

Bethlehem forging equipment provides for the manufacture of any size and type forging from the smallest drop forging to the largest hydraulically pressed forging. All work can be furnished rough turned or finished, heat treated or annealed.

Castings of Every Type and Size

Illustrated at the right is a steel Hydraulic Turbine Runner casting. This casting represents very intricate core work and expresses clearly Bethlehem's ability to make difficult castings.

Bethlehem Foundries are equipped to make all types and sizes of castings—carbon and alloy steel, gray iron, Mayari iron mixtures, brass and bronze. We are also prepared to rough turn or finish machine all work.



Hydraulic Turbine Runner. Casting was double annealed and weighs 43130 lbs.

Let us quote on your requirements.

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

District Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo
Cleveland Detroit Cincinnati Chicago St. Louis San Francisco Seattle Los Angeles

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

HAMMERED & DROP FORGINGS
MILWAUKEE
WELDLESS RINGS
 MILWAUKEE FORGE & MACHINE CO.
 340 OKLAHOMA AVE. MILWAUKEE, WIS.

ATLAS
 DROP FORGING ENGINEERS AND
 MANUFACTURERS SINCE 1906
 (ATLAS DROP FORGE CO.)
 LANSING MICHIGAN

FORGINGS
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 Drop and Upset
SHEAR KNIVES
 Solid Hammered Crucible Tool Steel Blades
 Cast Steel Blades for Slab Mill Shears
PITTSBURGH KNIFE AND FORGE CO.
 OFFICE AND WORKS, CORAOPOLIS, PA.

THE DROP FORGING CO. of NEW YORK
 Steel  Brass
 Copper Monel Metal
GENERAL FORGINGS
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JOHN McWILLIAMS & SONS
 PLAIN & INTRICATE **Forgings** EST. 1880
 BARS - RINGS
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DROP FORGINGS
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STRIEBY & FOOTE CO.
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Drop Forgings
 as good as can be made

DROP FORGINGS
 The CLEVELAND
HARDWARE CO.
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DROP FORGINGS THAT SATISFY
ENDICOTT
 ENDICOTT
 FORGING & MFG. CO., INC.
 ENDICOTT NEW YORK

A RELIABLE SOURCE
FEDERAL
 DROP FORGE CO.
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DROP FORGINGS FROM SMALLEST TO LARGEST
 Upset and Machined Forgings
 TRUCK, AUTOMOBILE, CAR
 AND GENERAL FORGINGS
CANTON FORGE & AXLE COMPANY
 2005-2039 DUEBER AVE., S. W., CANTON, OHIO

Drop Forgings to Order
 Breaker Teeth—Conveyor Links
 and Langan Grab Hooks
THE SCRANTON FORGING CO.
 SCRANTON, PA.

STORMS QUALITY
 DROP FORGINGS
DROP FORGING
 PAGE B'L'V'D. CO.
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1864 **DROP FORGINGS** 1926
 AUTOMOBILE CARRIAGE SPECIAL
 We specialize in forgings of nickel steel,
 chrome nickel, vanadium tool, open hearth,
 Bessemer steel and Norway iron. Estimates
 furnished and deliveries made promptly.
 Latest equipment for heat treatment.
 The E. D. Clapp Manufacturing Co. Auburn, N. Y.

INDIANAPOLIS DROP FORGING CO.
 MANUFACTURERS OF AIRPLANE DROP FORGINGS
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Drop Forgings

We can and will make any FORGING you want and deliver it when you want it.

EQUIPMENT
400 lbs. to 8000 lbs.
Steam Drop Hammers

RICHMOND FORGINGS CORPORATION
Richmond Virginia

<p>FRONT AXLES STEERING SPINDLES</p>  <p>GEAR BLANKS CRANK SHAFTS</p>	<h2>DROP FORGINGS</h2> <p>Backed by 40 Years' Experience</p> <p>ANYTHING THAT CAN BE DROP FORGED UP TO 300 LBS.</p> <p>MODERN HEAT TREATING AND LABORATORY FACILITIES</p> <p>***</p> <p>UNION SWITCH & SIGNAL CO. Drop Forge Division Pittsburgh District Swissvale, Pa.</p>	<p>DROP FORGED PIPE FLANGES</p> <p>HIGH HUB LOW HUB</p> <p>HYDRAULIC REDUCING</p> <p>Large Stock on Hand at All Times</p>
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SUPERIOR

DROP-FORGINGS TO ORDER

Any shape possible to drop-forge. Any size up to 350 lbs.

Heavy Forgings

Up-to-date laboratory — and — heat-treating facilities

Our Speciality

J. H. WILLIAMS & CO.
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Carriage, Wagon, Automobile and Special

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RICHARD ECCLES CO., Auburn, N. Y.
ESTABLISHED IN 1880

Quality and Service Guaranteed

GENERAL DROP FORGE CO.


SPECIAL DROP FORGINGS OF ALL KINDS TO ORDER

SEND US PRINTS OR MODELS FOR PRICES

BUFFALO, N. Y.

DROP FORGINGS STAMPINGS

for Every Industrial Purpose



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ALLIANCE, OHIO

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WE SPECIALIZE ON
SMALL DROP FORGINGS

Plants centrally located and specially equipped to manufacture high quality drop forgings, up to 6 lbs.

40 years' experience

THE QUEEN CITY FORGING CO.
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**Acid Open Hearth
STEEL CASTINGS**
for all purposes

READING STEEL CASTING CO., Inc.
Offices and Warehouses in Principal Cities
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**DROP FORGINGS
OF THE HIGHEST QUALITY**

THE D. WILCOX MANUFACTURING CO.
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Acid Open Hearth Steel Castings

1 to 10,000 lbs. each.

Ships Castings Railroad Castings Fittings
Steel Castings of Every Description

LIGHT WEIGHT **STEEL** MEDIUM WEIGHT
CASTINGS

Heat-treated for maximum physical strength and toughness, carefully checked for imperfections, accuracy of shape and size.

WM. WHARTON JR. & CO., INC.
EASTON, PA.

High Grade
STEEL CASTINGS

Open Hearth Process

**THE COMMERCIAL
STEEL CASTING CO.**

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Shipping Facilities on Five Railroads

Sales Offices:
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STRONG STEEL CASTINGS

Always connect above with

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10 Pounds to 15 Tons

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Steel castings of every description - Inquiries solicited

AMERICAN STEEL FOUNDRIES

Address all communications to Dept. M., 1684 Wrigley Bldg. Chicago



DYCAST

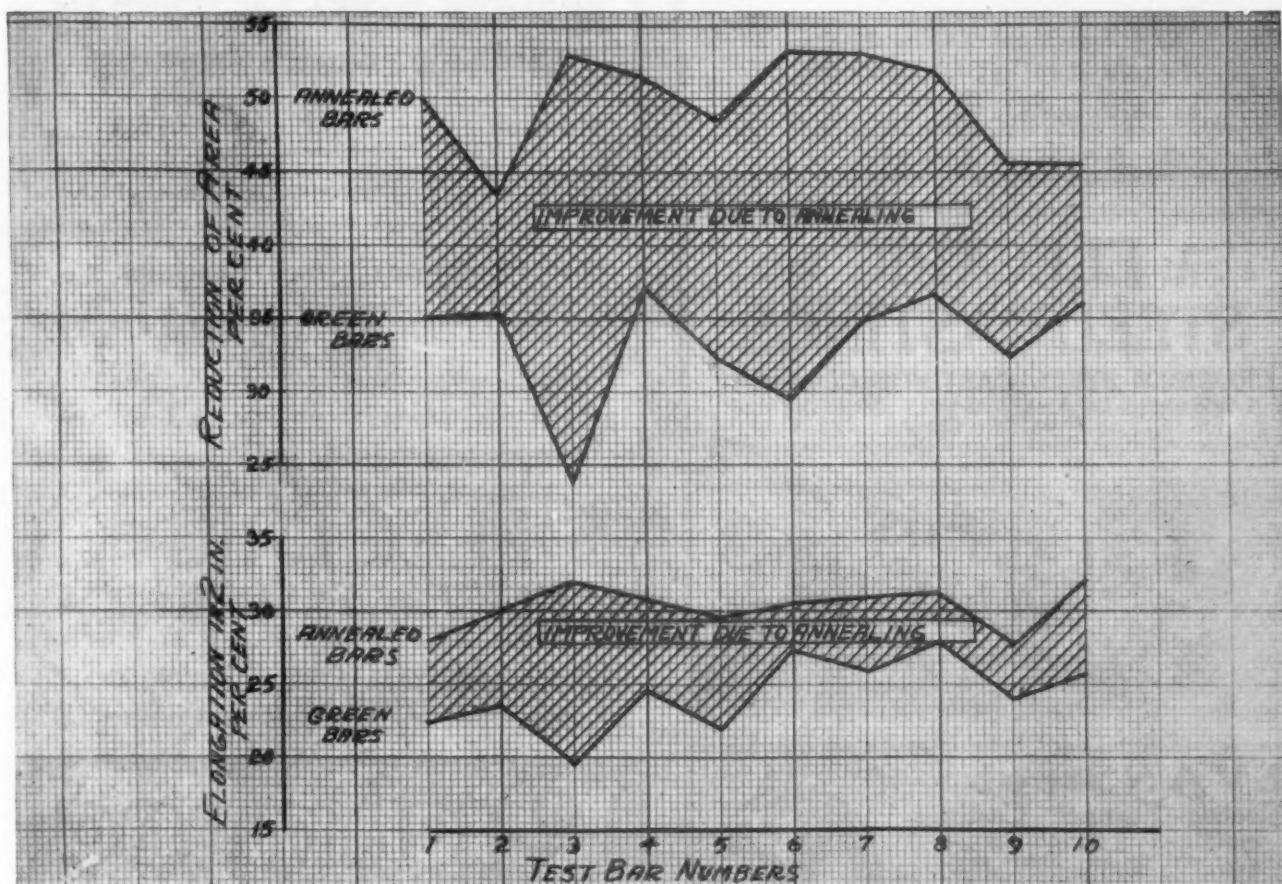
HIGHEST QUALITY CRUCIBLE STEEL CASTINGS

Tool steel, high speed, chrome and nickel and commercial steel castings. Entirely free from blow holes, hard spots and will machine freely.

See full page announcement in January 1st issue

DYCAST STEEL COMPANY

COLLINSVILLE, CONN.



Improving Ductility

All Nugent Steel Castings are annealed as a part of our standard foundry practice at no extra charge because we consider annealing essential in the production of quality castings.

The chart shows the improvement in ductility due to annealing.

In addition, annealing in the Nugent Electric Annealer is more uniform and thorough than is possible by any other commercial means. Our "F" Series of Bulletins deals with Annealing and other foundry problems.

THE NUGENT STEEL CASTINGS COMPANY
31st and Wood Streets, CHICAGO



NUGENT STEEL CASTINGS

Reducing Castings Inventories with Better Delivery



Due to our location near the Central Manufacturing District of Chicago, we have been able to give prompter freight deliveries to many customers than plants much nearer to them could give.

One of our out-of-town customers has found that our ability to deliver with uniform regularity and on short notice has enabled him to reduce his monthly inventory of castings by \$30,000.

Castings can be delivered by us to merchandise cars in the afternoon, and leave for any of 2,500 cities on through trains that evening.

There is no faster or more complete service known than this, nor is a service like it possible outside of Chicago.

IRON CASTINGS

Specialty of Machine-Moulded Castings
True to Pattern and of Uniform Softness
FAIRMOUNT FOUNDRY, INC.

Main Office
3rd and Westmoreland Sts., Philadelphia, Pa.
Plants: Philadelphia and Hamburg, Pa.
SEMI-STEEL CASTINGS

MONROE STEEL CASTINGS CO.

ELECTRIC FURNACE PROCESS

MONROE



MICHIGAN

From
a Pound
to a Ton

ELECTRIC STEEL CASTINGS

Inquiries
Solicited.

CRUCIBLE STEEL CASTINGS COMPANY
LANSDOWNE, DELAWARE COUNTY, PENNSYLVANIA
(Near Philadelphia)

The Cincinnati Steel Castings Co.

Manufacturers of
ELECTRIC STEEL CASTINGS

SPECIAL STEELS

Vanadium Chrome Case-Hardening Motor Steel Nickel Steel

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**ELECTRIC
STEEL CASTINGS**
5 TO 5000
POUNDS
TREADWELL ENGINEERING CO.
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**ELECTRIC
STEEL CASTINGS**
FROM 1/4 TO 2000 LBS IN QUANTITIES
THE INDUSTRIAL STEEL CASTING CO.
TOLEDO, OHIO

EVANSteel

Electric Furnace Castings

The identifying mark.

FAST service on all types and sizes
of steel castings. Modern plant,
Electric furnaces. Expert personnel.
Engineering cooperation without obli-
gation on all inquiries. Submit blue-
prints for quotations.

CHICAGO STEEL FOUNDRY CO.

Kedzie Ave. and 37th St., Chicago



I. A. 4-20-RTG

**Richmond
MALLEABLE CASTINGS**
Your satisfaction both in quality and
service is our aim.
Richmond Malleable Castings Co., Richmond, Ind.

ELECTRIC STEEL CASTINGS

Carbon Steel. Also alloys chrome, nickel,
vanadium. Modern plant. Good service.

CRUCIBLE STEEL CASTING CO.
CLEVELAND, OHIO

MALLEABLE IRON CASTINGS

Quality and Quantity Producers
VERMILION MALLEABLE IRON CO.

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Service - Quality

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EVANSVILLE, INDIANA

**STEEL
CASTINGS**
FEDERAL STEEL FOUNDRY CO.
Foot of Reaney St., Chester, Pa.

Malleable Castings
of **GUARANTEED QUALITY**
for Railroad, Agricultural Imple-
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MAYNARD ELECTRIC STEEL CASTING COMPANY

Electric steel castings from 1 to
5000 lbs. each

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CASTINGS**
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CADILLAC, MICH.

Our Foundries Are Devoted Solely To Producing Malleable Castings Of Light or Medium Weight

THE exceptional quality of Canton Malleables is the result of 34 years' experience in specializing on castings of light or medium weight.

Canton Malleables are uniform, accurate and true to pattern. They are properly cast, annealed, tested and inspected to assure production wherein the virtues of this remarkable metal are developed to their highest degree.

With this rigid care in manufacture, Canton Malleables are fully guaranteed.

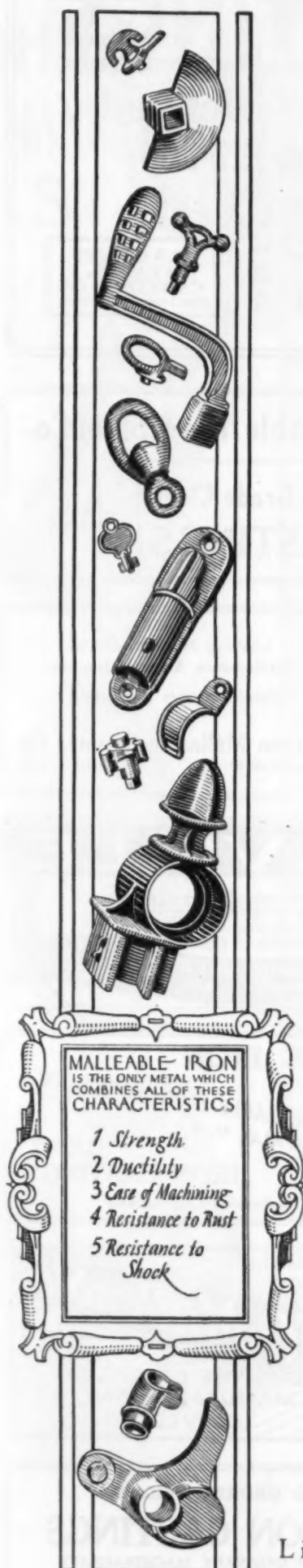
For small castings, the physical merits of malleable iron are far superior to any other ferrous metal at a cost which, in comparison, shows a definite saving.

Our Engineering Department is at your disposal without charge to assist in the study of new applications for malleable iron where its toughness, ease of machining, resistance to shock and other fine characteristics are particularly desirable.

The CANTON MALLEABLE IRON COMPANY

Canton, Ohio

Light and Medium Weight Malleable Castings



MALLEABLE IRON CASTINGS
NEWARK MALLEABLE IRON WORKS
 QUALITY NEWARK, N. J. SERVICE

LINK-BELT Malleable Castings
 Malleable iron castings, small or large, of the same high quality as used in our various chains. Let us quote.
LINK-BELT COMPANY, INDIANAPOLIS, IND.

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 **CASTINGS OF GUARANTEED QUALITY**
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PROMPT SERVICE AND SHIPMENTS

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Superior MALLEABLE CASTING Quality is our qualification for use of the insignia

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 The Marion Malleable Iron Works, Marion, Ind.

MALLEABLE IRON, GRAY IRON and SMALL STEEL CASTINGS
 Either Rough or Machined
 Malleable Iron and Gray Iron
PIPE FITTINGS
STANLEY G. FLAGG & CO., Inc.
 Office: Philadelphia, Pa. Works: Stowe, Pa.

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 **Certified** 
 Annual Capacity 25,000 Tons
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CASTINGS
 Certified Refined
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High Grade Clean CASTINGS
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MALLEABLE CASTINGS
 Castings for Agricultural Implements, Automobiles, etc.
 Small castings a specialty.
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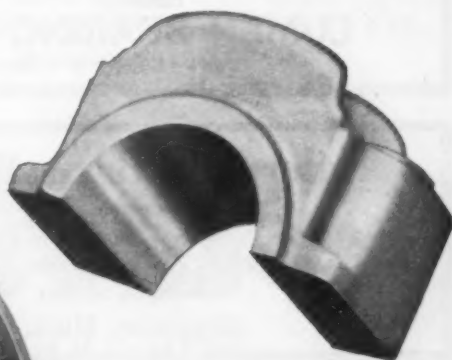
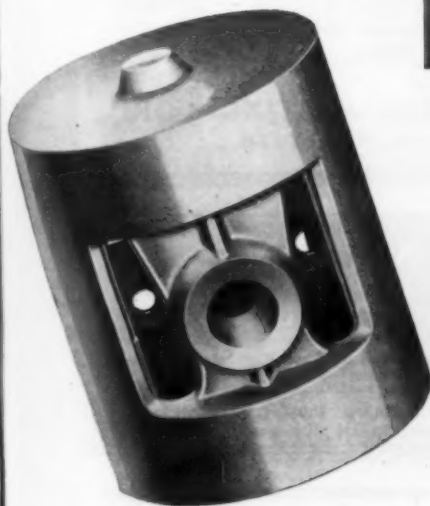
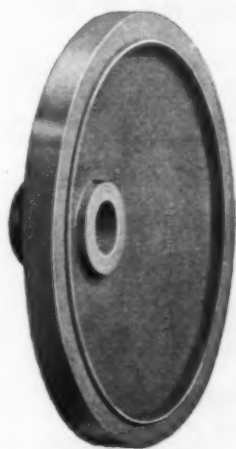
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GRAY IRON CASTINGS
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47 YEARS OF QUALITY AND SERVICE
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LIGHT AND MEDIUM WEIGHT GRAY IRON CASTINGS
 WITH MORE THAN ORDINARY MACHINABILITY
 WE MEET YOUR REQUIREMENTS
WALWORTH RUN FOUNDRY COMPANY
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BOHNALITE PERMANENT MOLD CASTINGS



Uniform Throughout!

BOHNALITE Permanent mold castings are uniformly hard throughout, for they are poured into heated molds.

At the same time the cooling rate is sufficiently fast to insure a fine-grained structure—and there are never any voids or blowholes.

Whenever Bohnalite castings are substituted for cast-iron, malleable iron or steel the weight is reduced 60% (a cast-iron casting weighing a hundred pounds would only weigh forty pounds in Bohnalite.)

BOHNALITE is cast in sand, semi-permanent and permanent mold.

BOHN ALUMINUM & BRASS CORPORATION
EAST GRAND BOULEVARD, DETROIT

We Specialize in
Gray Iron Castings

Fine Small Hardware Castings, Ingot Molds for Brass and Copper, Manhole Frames and Covers, Building Castings, General Machinery Castings up to 30 tons each.
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Established 1879



**I.S. Spencer's Sons
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Guilford, Conn.
Manufacturers of
Light Gray Iron,
Brass and Bronze
Castings
Patented Articles
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**You specify analysis of Brass
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finished product**

of airplane-part-quality, assuming responsibility for entire job of brass or bronze. Let us quote on
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Use our 35 years' experience

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A GOOD NAME TO REMEMBER WHEN BUYING
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*Accurate, Clean
To Exacting Specifications*
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**BRASS, BRONZE OR COPPER
CASTINGS**
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Manufacturers of
PLUMBERS' BRASS GOODS
BRASS, BRONZE AND ALUMINUM CASTINGS
Your Inquiry Solicited
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Fredericksen Company
Brass, Bronze and Aluminum
Castings
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**MARF
DIE
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EVEN through the growth of our facilities and the expansion of our business, we have held fast to that man-to-man touch which makes for understanding, and in the long run, the greatest satisfaction.



**MARF MACHINE and DIE CASTING
COMPANY**
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**HAVE YOU OVERLOOKED THIS
SOURCE OF
DIE CASTINGS?**

It will pay you to investigate price, service and prompt delivery we afford to users of die castings in aluminum, white metal, tin and lead.

*Estimates from Samples, Sketches and Blue
Prints*

MT. VERNON DIE CASTING CORP.
MT. VERNON, NEW YORK

**FRANKLIN
DIE-CASTINGS**



We cast in Aluminum, Tin, Lead and Zinc base alloys. Estimates made from samples, drawings, or blue prints. Send for booklet.

FRANKLIN DIE-CASTING CORPORATION
Gifford and Magnolia Streets, Syracuse, N. Y.



DIE CASTING SINCE 1908
and blueprints for estimates
SOSS MANUFACTURING CO.
Grand Ave. and Bergen Street Brooklyn, N. Y.

The **ULTIMATE** in
Strength - Accuracy - Uniformity
and Finish

Aluminum - Zinc - Tin and Lead Base Alloys

We will furnish estimates on blue prints or samples

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MSR
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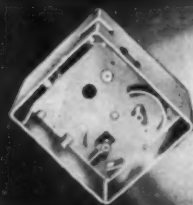
Branch Offices

New York Pittsburgh Buffalo Chicago
San Francisco Los Angeles

Make Your Own Die Castings

New Semi-Automatic reduces cost 25%-40%. You can make your own cheaper than you can buy and machine castings from brass, bronze or iron. Send for estimates, enclose blue prints or send samples. See our advertisement in second issue of each month.

Lynd Farquhar, Boston, Mass.



**HI-STRENGTH
ALLOY**

Sterling
DIE CASTINGS

STERLING DIE CASTING CO., INC.
741 39th Street - Brooklyn, N.Y.
Detroit Office - 8242 Woodward Ave.

SEND BLUEPRINTS FOR ESTIMATES

Stewart
Die Castings

Stewart Die Casting Corp., 4506 Fullerton Ave., Chicago

Quality Die Castings

Employing satisfied and satisfactory
labor.

GENERAL DIE CASTING COMPANY
READING PENNSYLVANIA



Use G. P. & F. Stampings Wherever You Can— It's Money Saved

Manufacturers all around you are using more and more stampings in place of castings, forgings, or wooden parts. By so doing they lower their production costs, and obtain stronger, lighter, and better looking parts. Are you using stampings as fully as you ought?

Our complete facilities in a 15 acre plant with a background of 45 years of experience have helped many manufacturers reap the benefits of pressed metal. Just ask our opinion about your problem, and let us help you, too.

G.P.&F. SERVICE
KNOWING HOW SINCE 1881

Be sure to consult us.

Geuder, Paeschke & Frey Co.

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**STAMPED
METAL PARTS**

For every industry

Established 1883



QUALITY
STAMPINGS

We have had many years of Light and Heavy Stamping Experience. We offer you the benefit of our knowledge and equipment.



WORCESTER STAMPED METAL CO.
WORCESTER, MASS.

STAMPINGS

**HARDENING - PLATING - LACQUERING
ASSEMBLING**

ESTABLISHED 1890

THE H. A. MATTHEWS MFG. CO., Seymour, Conn.

PRESSED METAL IS INEXPENSIVE

One stroke of a stamping press will often accomplish more than a day's work in many other shops. For that reason stampings are not expensive.

Stampings can be made within close limits. They can be formed into attractive shapes that are strong but light in weight. Furthermore they will take any commercial finish.

Send for an estimate on your work, let us show you how inexpensive stampings really are.



The Metal Specialty Company

1533 West 6th Street, Cincinnati, Ohio

How One Plant Saved Money By Making This Flange as a Stamping

—Instead of a Casting



Here is a typical Bossert stamping which has replaced a casting. Note what a clean-cut job the stamping is—no rough edges to grind off, no drilling, no machining. The flange is ready to use now without any additional work on it.

This is one of the advantages of Bossert stampings—you can use them as they come from our plant. This saves time, reduces production costs, and speeds up assembly.

Bossert stampings also cost less than castings or forgings. They are lighter, stronger, and take a better paint job. Why not see if you can replace some of the castings you use with stampings?

For over 30 years we have specialized in stampings. We can reproduce practically any part in steel, brass, copper, zinc, terne plate, monel metal, tin, or aluminum in thickness from .005" to 1".

Send us a sample part or blue print and get our quotations.

THE BOSSERT CORPORATION, Utica, N. Y.

605 Sweetland Bldg.
Cleveland, Ohio

30 Church St.
New York, N. Y.

1017 Ford Bldg.
Detroit, Mich.

BOSSERT Facilities

- Expert Engineering service.
- Stampings in all metals from .005" to 1" in thickness.
- Electric and Oxy-Acetylene Welding.
- Case Hardening.
- Hot and Cold Tinning.
- Cold Galvanizing.
- Brass, Copper and Nickel Plating.
- Polishing.
- Enameling.
- Assembling.

BOSSERT
for Stampings
Large & Small

Motor Wheel

*"Stampings of steel
plate are used more and
more for supporting the engines"*

—AUTOMOTIVE INDUSTRIES, 1926 REVIEW

And the most highly developed mountings of that type are by Motor Wheel.

Very clearly in these applications of pressed steel Motor Wheel ingenuity is simplifying crankcase design, saving weight and bulk, adding strength, and speeding assembly.

Similarly profitable stamping applications may be possible in your output. You can judge only in the light of possibilities offered by Motor Wheel—so far advanced is Motor Wheel stamping science. Specify an appointment date.

MOTOR WHEEL CORPORATION, LANSING, MICHIGAN

*Flanged Rear Engine
Support and Cross Member—
an original stamping
by Motor Wheel*

Motor Wheel
PRODUCTS

STAMPINGS

CROSBY STAMPINGS

Send us your stamping problems; our 25 years' experience will help solve them.

Consult Our Engineers.

THE CROSBY CO., Buffalo, N. Y.

New York Office: 80 Church St.
Detroit Office: 1709 Ford Bldg.

Cleveland Office: 334 Union Mortgage Bldg.
Philadelphia: 7302 Germantown Ave., Germantown, Pa.

Chicago Office: 530 Transportation Bldg.



"Cutting Corners"

that
counts

No matter how many times your small castings or stampings have been simplified—let us take a whirl at them. We can very likely make them better for less.
Send us samples or blue prints with some idea of quantities used. We will gladly show you what we can do.

The Akron-Selle Company
"41 Years in Business" Akron, Ohio

LIGHT STAMPINGS

In non-ferrous metals only

Long experience enables us to give expert service in brass, copper, aluminum in all sizes and gauges. Battery of multiple spindle drill presses for gray iron machine work.

WHEELER RADIATOR & MFG. CO.

1637 COLLAMER AVE., CLEVELAND, OHIO

Eastern Office: 64 Marval Road, New Haven, Conn.

Detroit Office: 2-120 General Motors Building, Detroit, Mich.

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BOTH experience and facilities equip us to produce metal stampings not "how cheaply" but "how well."

The Globe Machine & Stamping Co.
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GOOD DIES STAMPINGS
DETROIT STAMPING CO.
3445-59 W. Fort St., Detroit, Mich

STAMPINGS
ALL — MATERIALS
— SHAPES
— FINISHES

MATTHEWS MANUFACTURING CO.
1890 WORCESTER, MASS. 1926

STEEL STAMPINGS

from OPEN HEARTH
to
FINISHED PRODUCT

ATASCO

THE AMERICAN TUBE &
STAMPING CO.
BRIDGEPORT, CONN.

STAMPINGS

Die Makers

THE E. KONIGSLOW STAMPING & TOOL CO.
Cleveland, Ohio.

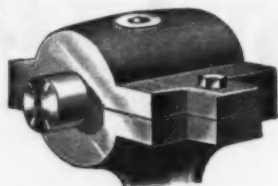


Bennett Hendy-Top Oil Cup

Made in sheet steel or brass, these oil cups show the accuracy of all Bay State Stampings.

We make other specialties and are in position to produce promptly high grade stampings to your specifications. Write us about your needs.

BAY STATE STAMPING COMPANY
380 Chandler St. Worcester, Mass.



Harry Brothers Manufacturing Co.

STAMPINGS**DIES**

Detroit

Michigan



HEAVY

MEDIUM

STAMPINGS

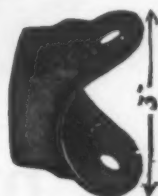
Send Samples or Blue Prints for Estimates

Lansing Stamping Co.

LANSING, MICHIGAN

DETROIT CHICAGO DAYTON, O.
8847 Woodward 4554 Broadway 237 N. Wilkinson**Specialists in Metal Goods**

Metal goods to order from Brass, Zinc, Aluminum, Steel. Drawn work, stampings, assembled parts or completed articles. All finishes. Estimates furnished.

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Makers of "Trouble Free" Stampings

Assemblers Welcome Our Products

because they know that each piece will be accurate to size and will fit where it belongs. This is a saving in both time and money.

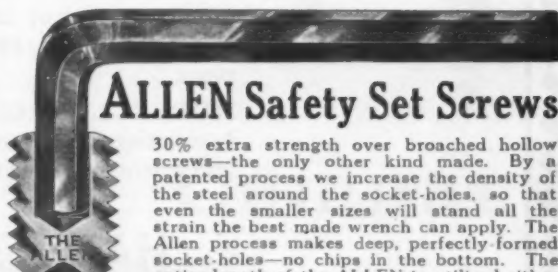
Let us prove it

New England Pressed Steel Co.
Natick Mass.**LARGE—STAMPING—SMALL**

and

ASSEMBLING**HEINTZ MANUFACTURING CO.**Front Street and Olney Avenue
PHILADELPHIA, PA.

STAMPINGS
DIES & TOOLS
COMPLETE PLANT
OVER 30 YRS. EXPERIENCE
The **OTTO KONIGSLOW MFG. CO.**
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**ALLEN Safety Set Screws**

30% extra strength over broached hollow screws—the only other kind made. By a patented process we increase the density of the steel around the socket-holes, so that even the smaller sizes will stand all the strain the best made wrench can apply. The Allen process makes deep, perfectly formed socket-holes—no chips in the bottom. The entire length of the ALLEN is utilized either for solid metal at the point, or depth of socket for the wrench. All sizes in stock from 1/4 to 1 1/2 in.; any length, point or thread. Also Pipe Plugs, Socket-Head Cap Screws, Tap Extensions and Socket Wrenches—Allen process. Descriptive catalogue on request.

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Flat and Formed Pieces of Medium Size Our Specialty

LIGHT WASHERS AND BURRS

JAPANNING, TINNING, ELECTRO PLATING

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U. S. A.**PRESSED STEEL PARTS**

30 YEARS EXPERIENCE

THE AMERICAN PULLEY CO.

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**UNBRAKO**

hollow set and sockethead cap

SCREWSwon't fracture
heads won't round out
points won't mushroom

Get free samples for testing. Then get prices—Unbraiko screws cost less!

Standard PRESSED STEEL COMPANY

The Pioneer Steel Hanger People

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Made of special steel, heat-treated by Standard's own private process.

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Our complete facilities and wide experience enable us to do fine work, and make prompt deliveries. Our quotations are bound to satisfy you. Write for estimate.

THE HOLMES SPECIAL TOOL CO.

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Bettcher
PRESSED METAL
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Stampings
in all
metals,
from small
to large

THE BETTCHER STAMPING & MFG. CO.

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**MACHINE SCREWS
SCREW MACHINE
PRODUCTS****WIRE FORMING
LIGHT METAL STAMPING****WARNER BROTHERS COMPANY**Metal Division
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About better machine screws

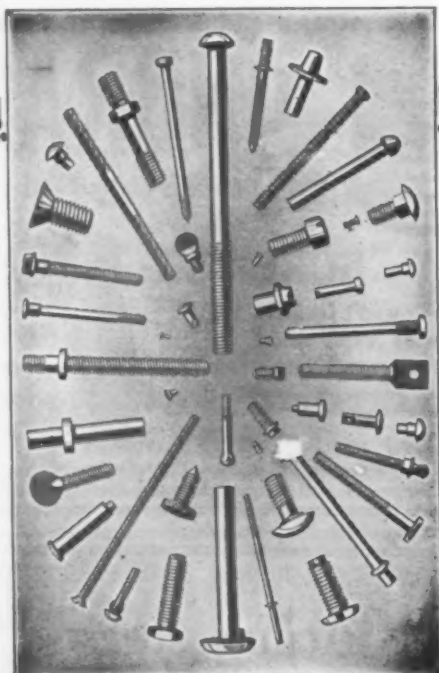
Machine Screws are either good or bad, fits or misfits, useful or useless. If they are not right in the first place, they will not work right in any place.

HUBBELL MACHINE SCREWS impose no restriction on assembling. Their use saves time and encourages profits.

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PERHAPS a great many of your parts that are at present made from the bar could be produced by our process. It is to your interest to investigate.

MACHINE SCREWS MACHINE SCREW NUTS

*Rivets to Order Only
From All Grades of Material*

"Promco" Quality Brand of Interchangeable bolts and nuts to A. S. M. E. Specifications.

Binding head, Washer head, and special screws for Electrical requirements is one of our specialties. Their uniformity of construction insures you against slowing down in your assembly operations.

The priceless ingredient of every product is the honor and integrity of its maker.

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Machine Screws
Stove Bolts, Tire Bolts

American Screw Company

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WESTERN DEPOT:

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Wood Screws

*Rivets, Roofing Nails,
Scratch Brush Wire
and Pipe Coupling*

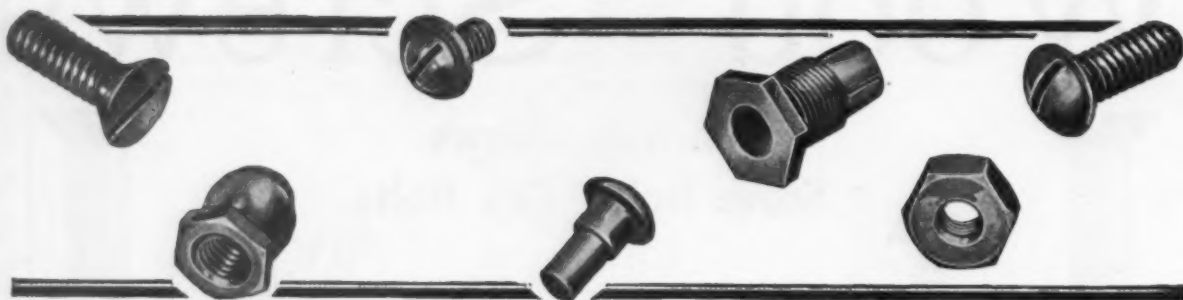


THE BRIDGEPORT SCREW CO.

Bridgeport, Conn.

Representatives: George E. Quigley, Detroit; Milton Pray Co., San Francisco, Los Angeles, Seattle
G. M. Baird & Co., Memphis, Tenn.

Since 1849



Screws, Nuts, Screw Machine Products

You can rely upon these products to the utmost. We have for over three-quarters of a century pleased the most critical. Let us show you how well and how speedily we can take care of your needs.

Threaded Wires, Special Rivets, Formed Wires and a variety of special parts from wire and rod are also produced by our organization. Tell us what you need.

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Cap Screws
Set Screws
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Hanger Bolts
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Specialties

Every individual unit must meet Reed & Prince standards of quality and accuracy. Whether finished plain, blued, nickel, brass, copper-plated, sherardized or hot-galvanized, it may be selected with the utmost confidence.

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WESTERN BRANCH at CHICAGO-121 NORTH JEFFERSON ST.

"PAWTUCKET" Coach Screws

Accurately cut threads, Gimlet Points, Full Heads. We can ship these screws in any quantity.

Let us take care of your needs for special bolts and nuts—our 44 years' experience guarantees satisfaction.



Pawtucket Manufacturing Co.

Pawtucket

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The Cleveland Cap Screw Company

Manufacturers

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Quality Stock for Immediate Shipment

Sales Offices at Detroit, New York, Chicago, Atlanta, Buffalo, Cincinnati, Memphis, Los Angeles and San Francisco.



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We manufacture a complete line of Screws, Bolts, Escutcheon Pins and Chain, also Special Screw Machine Products. Quotations promptly and gladly furnished.

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Successor

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WHETHER your requirements are for maintenance or production, Mac-it screws will meet your needs and save dollars in repair bills.

Practically 100% satisfaction with their use. You get:

**Fast Assembly
Firm Adjustment
Strength and Safety**

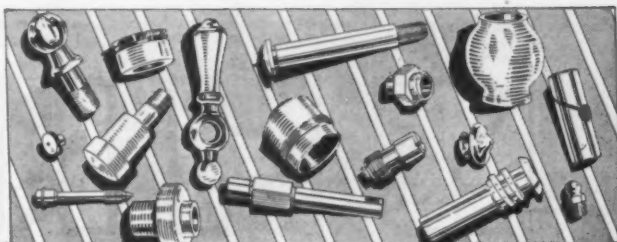
No danger of breakage, no splitting, no need to dig out a broken screw, but continuous, uninterrupted service.

Mac-its are especially adapted for dogs, dies, machine tool fixtures and wherever there is frequent adjustment. Invaluable where there is constant jar and vibration. For high speed machinery where hollow screws are required and where safety is considered. Should be used for intricate machinery where security is demanded.

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General Distributors
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No matter how exacting may be your requirements for screw machine products, we are equipped to serve you.

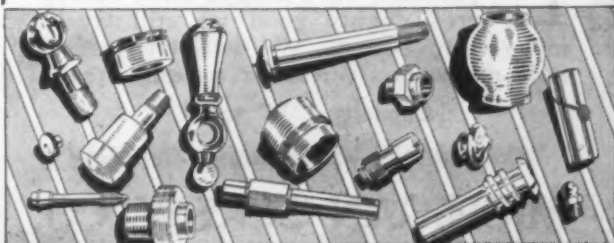
NAMCO products are known to thousands of users as parts that are made to exact specifications whether it be special parts to their blueprints or standard screws and nuts to U. S. S. & S. A. E. specifications. We stock U. S. S. & S. A. E. Cap Screws, U. S. S. Set Screws, S. A. E. Plain and Castellated Nuts.

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*Standard and Special Screw Machine Products
Automatic Screw Machines*



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When you order screw machine products from Shimer you get nothing but the highest quality of goods no matter how small the order may be.

You get the benefits of years of experience in small parts manufacturing from an established house of unquestionable reputation.

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EVEN though our screw machine products have always been considered mighty good we still try to make them better. We will try just as hard on yours. Write for an estimate.

Capacity 1/16" to 5".

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Our work pleases
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"hard to please"
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SPECIAL *Any Metal*
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Close Tolerances **MACHINE**
PRODUCTS

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"Spring Makers for Three Generations"
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**SCREW MACHINE
WORK**

Special parts turned from Brass, Steel and Iron,
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The best equipped shop in Greater New York.
Your work will be handled by Brown & Sharpe
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You can depend upon our delivery to keep your
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Screw Machine Products
Castle Nuts Cap Screws

AUTOMATIC SCREW MACHINE PRODUCTS

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We are
Growing

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ACCURATELY MADE AT A FAIR PRICE
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Specialists in the production of screw machine prod-
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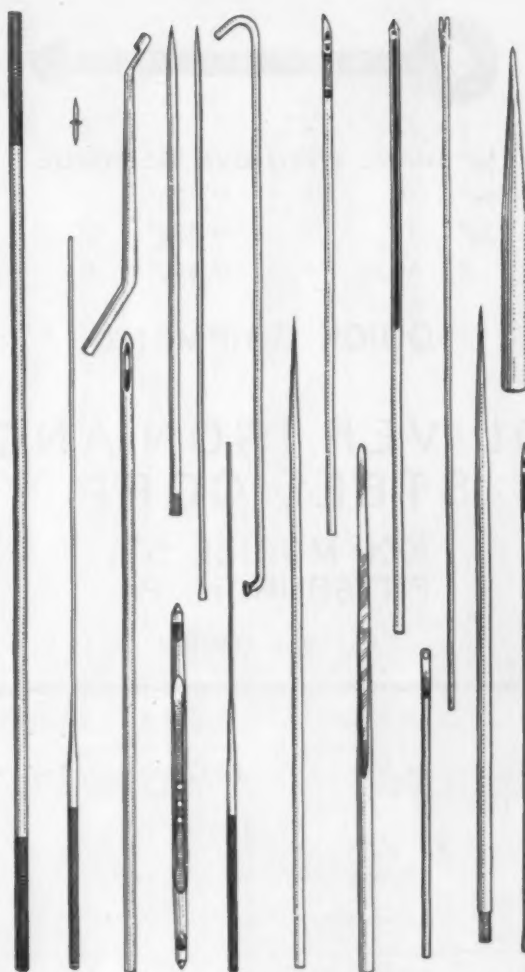
Screw Machine Products



CAP and SET
SCREWS

The Wm. H. Ottemiller Co., Inc.
Pattison St. and M. & P. R. R., York, Pa.

**PARTS
DIFFICULT
TO MAKE**



Illustrated to exact size, the above cut
shows 19 more typical parts of

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SPECIALTY DEPARTMENT**

As products of this Department, coming
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problem to us.

While to manufacture them is not a mat-
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a plant not otherwise adapted to such
purposes usually is a burden.

If you have requirements for such mate-
rials, our service and prices will interest
you.

THE TORRINGTON COMPANY

Torrington, Conn.

DROP FORGED WELDLESS EYE-BOLTS

ROLLED THREAD
GALVANIZED OR PLAIN



$\frac{1}{2}$ " DIAM. WITH EYE $\frac{7}{8}$ " INSIDE

$\frac{5}{8}$ " " " " $\frac{7}{8}$ " "

$\frac{3}{4}$ " " " " $1\frac{1}{8}$ " "

1 " " " " $1\frac{1}{2}$ " "

QUICK SHIPMENT

OLIVER IRON AND STEEL CORP.

1001 MURIEL ST.,
PITTSBURGH, PA.

ESTABLISHED 1863

Buffalo Bolt Co.

North Tonawanda, N. Y.

BOLTS, NUTS, LAG SCREWS
STEEL BARS, WIRE

of exceptional quality

SALES OFFICES:
Chicago Detroit St. Louis



UNUSUALLY SPECIAL -
BOLTS - NUTS
AND SCREWS

If you are having it
forged—if you have a hazy
idea what you want—let us
work out the "how" and
quote you.

Clark Bros. Bolt Co.
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BOAT

TRACK

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SPIKES BOLTS BARS

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Brass—Bronze—Copper
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Although we make deliveries in the shortest possible time we never sacrifice quality. From our vast stock of non-ferrous bolts, nuts, screws, etc., we can fill your order quickly. We can also make your unusual parts quickly. Our prices are always satisfactory.

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Rockford Bolt Company



ALL KINDS OF BOLTS
Nuts, Washers, Lag Screws, Riv-
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gings, etc., either plain or gal-
vanized. Try us today.

Prompt Shipments Everywhere.

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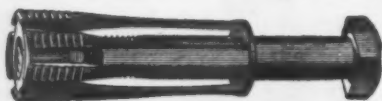
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AND DROP FORGINGS

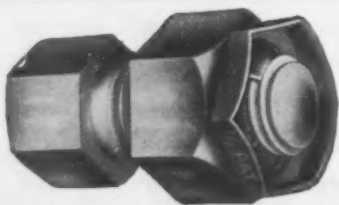
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Do You Want the BEST Expansion Bolts?



THE BROHARD COMPANY, Philadelphia, Pa.

To keep on growing, keep on
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read your business paper care-
fully each week.



PALNUTS HOLD!

Palnuts always hold. The prongs fit into the thread and press against the solid body of the bolt. The greater the pressure the tighter the grip. Easy on—easy off. Write for your test samples.

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WIRECOATED
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BASIC WIRE**American Steel Company**

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Made in all sizes for every purpose.

Samples sent on Request.

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NEW BRIGHTON PENNSYLVANIA**COLD MADE RIVETS**Standard or Special
in Every Size

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Cold Finished Steel, Screw
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*Oldest and Largest Rivet Mill in United States***Washers—**

Standard and special shapes and sizes.

Any quantity

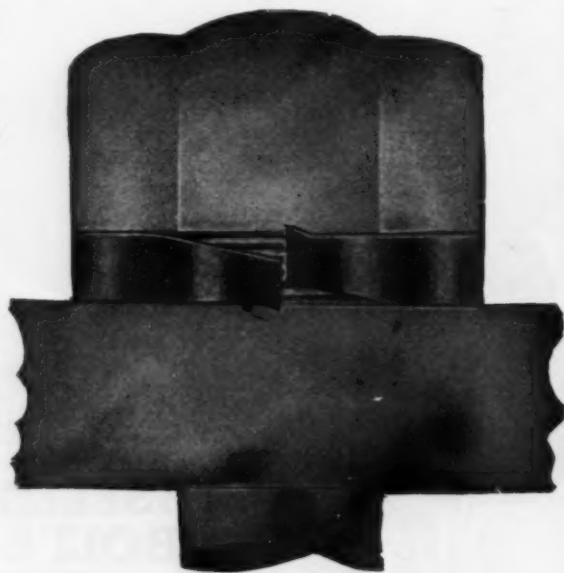
You will find our service a source of great satisfaction in the prompt supply of washers and

Light Steel Stampings

JolietWrought Washer
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Joliet Ill.**Genuine "KEYSTONE"**
Positive Type Lock Washers
~for Stability

A Genuine "Keystone" Positive Type Lock Washer is no more likely to slip than is the keystone in the arch itself. The barb-like ends of the Genuine "Keystone" Positive Type Lock Washer dig their toes in, and refuse to move.

These washers are positive insurance against loose bolts and nuts. Use them.

We also make
Genuine "Key-
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Lock Washers.**HAVE YOU OUR
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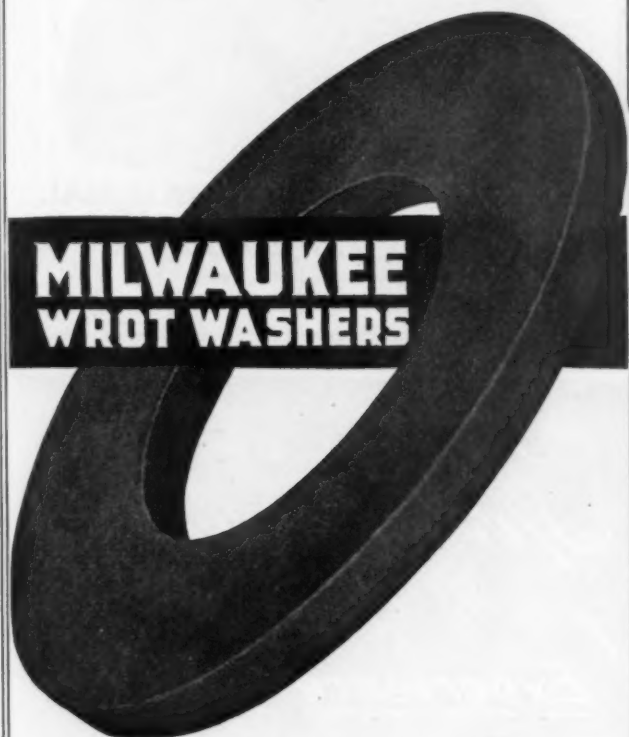
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*For Nearly 40 Years :: Lock Washers Exclusively*Pacific Coast Office: MAYDWELL & HARTZELL, INC., 158 11th St., San Francisco, Cal.
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WROT WASHERS**



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Established 1887

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**GOOD
SPRINGS**



**ACCURACY
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**Who
said
springs
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**if they want
good ones—
let us know
what kind!**



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Raymond Springs meet the requirements of the most critical. Can we serve you?

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ANY SIZE, STYLE OR MATERIAL
The Wm. D. Gibson Co.
QUALITY SPRING MAKERS
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Springs of all kinds
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Experience Counts*

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M. D. HUBBARD SPRING CO.

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ESTABLISHED 1905

COILED and FLAT SPRINGS
(Phosphor Bronze Springs a Specialty)
WELCH PATENT EXPANSION PLUGS
(For closing core holes)
SPECIAL WIRE SHAPES
SMALL STAMPINGS
WASHERS and SPRING COTTERS

Send blue prints or samples for estimates.
(CATALOG MAILED UPON REQUEST)



WELCH PAT. EXPANSION PLUG

Coiled and Flat Springs of every kind

The CLEVELAND Wire Spring Co.
Main Office, Cleveland, Ohio
BRANCHES: Garfield Building, DETROIT, MICH.
Machinery Hall, CHICAGO, ILL.

Most Advanced Method of Heat Treating



"ADVANCE" SPRINGS

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UNIFORM EXCELLENCE
REASONABLE PRICES
EXCEPTIONAL SERVICE

WIRE SPRINGS

ALL KINDS

NEWCOMB SPRING CORPORATION
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**Quality and Service
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Experience and a modern plant, thoroughly equipped, assure the best product at minimum prices. We solicit your inquiries for Round, Flat and Special Shaped Wire Springs of every design and analysis
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Complete Metal Specialties

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EAGLE BRAND SPRINGS

Quality, Practical Method of Manufacture and Heat Treatment are all essential in order to produce the highest character of springs. Send for illustrated booklet.

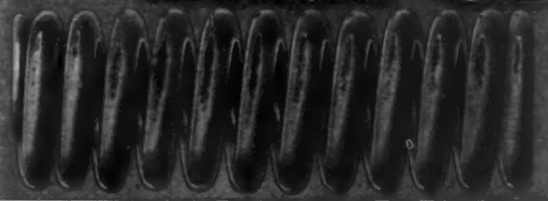
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COOK SPRINGS FOR MECHANICAL PURPOSES

COIL AND FLAT OF EVERY DESCRIPTION

SPRING

ANN ARBOR, MICH. CO.



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1660 Beard Ave. Detroit, Mich.

Because there may come a time when you will want expert advice to help solve a perplexing coiled wire or flat steel spring problem.

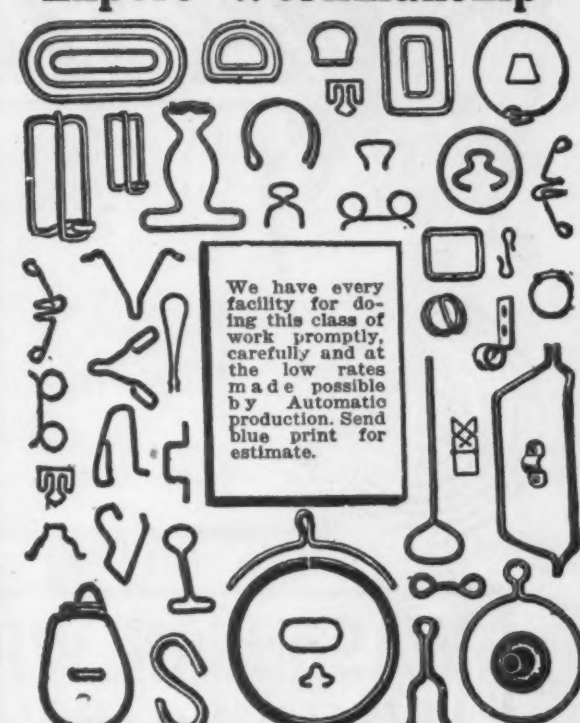
Even now you may be in this predicament, if so, get in touch with us. We can and will help you.

Makers of Coiled Wire & Flat Steel

SPRINGS



**Wire Bending Demands
Expert Workmanship**




We have every facility for doing this class of work promptly, carefully and at the low rates made possible by Automatic production. Send blue print for estimate.

Eastern Tool & Manufacturing Company
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WE SPECIALIZE IN
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Wire Products
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 Basic open hearth steel
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WIRE Electrical rope, barbed, plain, nails (bright and coated), tacks, spikes, bale-ties, hoops, springs, netting, wire fences, steel posts, steel gates, trolley wire, rail bonds, flat wire (strip steel), piano wire, round and odd-shaped wire, screw stock, concrete reinforcement. Aerial Tramways.

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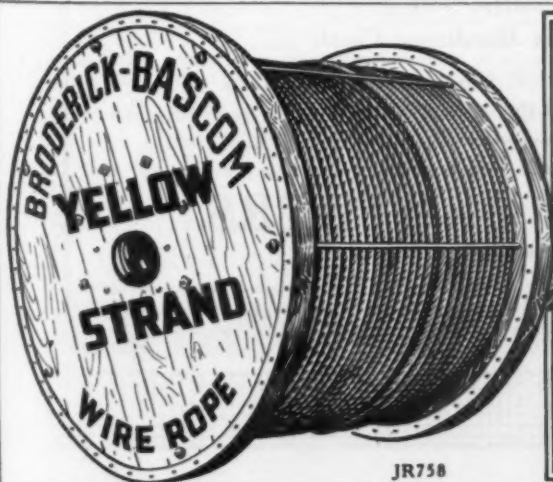
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INSULATED WIRES AND CABLES
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Yellow Strand Wire Rope is made of imported steel wire, triply tested before being laid up into cables. Rigidly inspected at every step of manufacture.

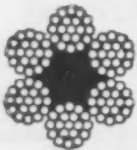
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Eastern Office and Warehouse:
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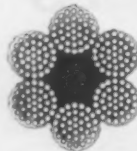
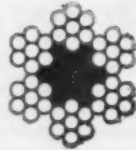
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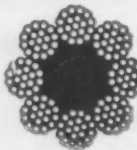
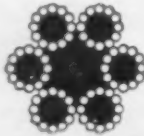
Leschen Wire Rope for Every Requirement



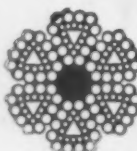
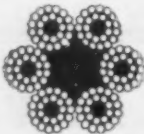
In successful Wire Rope usage construction is a factor quite as important as the proper selection of material.



The accompanying illustrations show cross section views of some of the various constructions we furnish. Every construction is made according to the "Leschen" standard.



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In Packages $\frac{1}{4}$ — $\frac{1}{2}$ —1 lb., 25 and 50 lb. Boxes

Write your Jobber for Full Information and Prices

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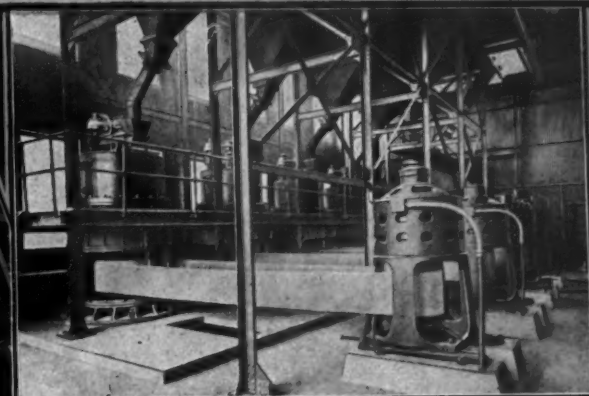
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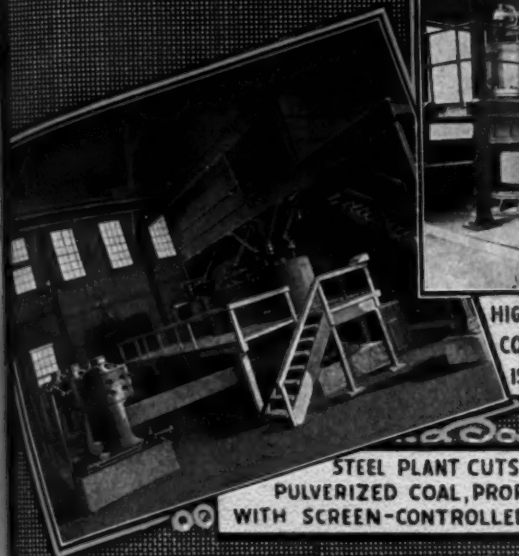
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Faster, More Uniform Pulverizing with the Positive Separation of Perfect Woven Screens



HIGH GRINDING EFFICIENCY, LARGE TONNAGE AND LOW COST COMBINE WHEN CEMENT MILL PULVERIZING IS CONTROLLED WITH Perfect WOVEN SCREENS



STEEL PLANT CUTS COSTS WITH PULVERIZED COAL, PROPERLY GROUND WITH SCREEN-CONTROLLED EQUIPMENT



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For faster, more uniform pulverizing—
To control selective grinding—
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For more impalpable powder,
or minimum dust or slimes—

Whatever the problem, product or process, Ludlow-Saylor Wire Cloth, properly selected and applied to grinding equipments, will save you Power, Time, Attendance and Replacement costs, improve the grinder product, facilitate subsequent processing, and produce more tons per machine, per square foot, per man, per hour, per dollar.

The Ludlow-Saylor Screen Book is a Text-Book on Wire Cloth. Engineers and Operating Departments everywhere depend on it for handy, reliable and intelligent Wire Cloth data. The comprehensive tables list a Thousand Standard Screens BY MESH—and then re-list them all BY OPENINGS.

Hundreds of full-size illustrations simplify selection; and 5,000 wire cloth samples, always at your command, facilitate comparative tests. They make easy a discriminate choice of new screen surfaces, or a positive check on the screens you have been using.

Send for your copy of Screen Book No. 47-T3—
The Text-Book on Screens.

Free on request, of course—no obligation.

All views courtesy of The Fuller-Lehigh Co., makers of Fuller Grinding Mills and Pulverized Coal Equipments.



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Screening Equipment	Filter Equipment
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2 ACCESSIBLE SERVICE
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Right Screen Makes Equipment Deliver Greatest Properly Processed Tonnage

Choice of screen cloth affects running time, shutdown time, equipment investment, floor space—all overhead items—beside tonnage.

For any purpose, at least a dozen kinds of screens can be made to answer. For instance, six are shown here in miniature, all suitable for the same separation. Properly applied, the products of all would be identical.

Choose the right screen, and with proper application the same equipment will turn out cleaner, more uniform work, require less attendance and power, and handle more tons per machine, per square foot, per screen-cloth, per man, per hour and per dollar.

For operating economy, two considerations far outweigh all others; they are: Quality of product (or efficiency of subsequent processing).

Variation of costs with the ratio of overhead per hour to tonnage per hour.

Only after these, may frequency, convenience or expense of replacements be considered.

Extreme Uniformity of Square Mesh Product

For meticulous elimination of oversize in fine screening, "Perfect" square mesh wire cloth stands alone.

Where the expense or convenience of replacement is important, specify heavy wires. A little engineering forethought, however, in pre-arranging screen replacements, will frequently effect the necessary changes of screen cloth without interruption to the process circuit.

Here lighter, faster-working, less expensive wires will multiply tonnage and improve the product.

The metal in Ludlow-Saylor fine wires has proved its temper and its quality in countless tonnage records. No crystallized metal here—no strains nor broken surfaces—but maximum resistance to abrasion, vibration, corrosion, pressure, shock, with minimum hindrance to flow of feed or passage of fines.

Rek-Tang Out-lives and Out-delivers

For coarser separations, where a cleaned or graded product is required, free from fines, Rek-Tang Screens excel. Unusually tough and heavy wires double and triple the strength and life of Rek-Tang Screens, without restricting output.

Greater tonnage and efficiency—more tons of cleaner product—result from using lighter wires and changing screens more often.

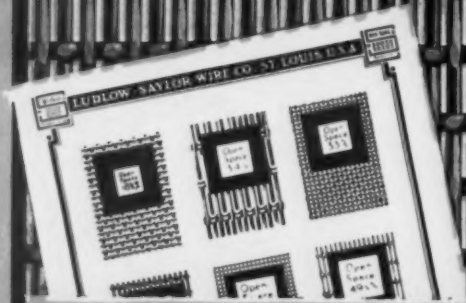
Weight for weight, wire for wire, hour for hour or screen for screen, Rek-Tang for ordinary separations will out-live and out-deliver any other classifying medium known today.

New Text-Book on Screens

In a 160-page book lately circulated, The Ludlow-Saylor Wire Company have turned out a complete text-book on screens and screening information.

Comprehensive tables list a thousand standard screens by mesh; a second section re-lists them all by openings; metric equivalents for all English designations, actual weights for all grades, and hundreds of actual-size illustrations make this book invaluable in the library of the process engineer.

Dozens of America's largest screen users have wanted extra copies for the engineering and operating men throughout their organizations. Practical screen men find it handy, dependable, intelligent. It is free on request, of course, to users of wire cloth or screens of any kind.



Dependable Wire Cloth Service

You can count on Ludlow-Saylor Service to handle all requirements to your best advantage. Screen users of all America depend upon St. Louis for complete, reliable, economical and quickly accessible Wire Cloth Service

"Perfect" Double Crimped Square Mesh Screens

Mesh	Weight per Sq. Yd.	Weight per Sq. Ft.	Weight per 100 Yds.	Weight per 100 Sq. Ft.
10	1.10	0.11	110.00	11.00
12	0.90	0.09	90.00	9.00
14	0.75	0.075	75.00	7.50
16	0.60	0.06	60.00	6.00
18	0.50	0.05	50.00	5.00
20	0.40	0.04	40.00	4.00
22	0.35	0.035	35.00	3.50
24	0.30	0.03	30.00	3.00
26	0.28	0.028	28.00	2.80
28	0.25	0.025	25.00	2.50
30	0.22	0.022	22.00	2.20
32	0.20	0.02	20.00	2.00
34	0.18	0.018	18.00	1.80
36	0.16	0.016	16.00	1.60
38	0.15	0.015	15.00	1.50
40	0.14	0.014	14.00	1.40
42	0.13	0.013	13.00	1.30
44	0.12	0.012	12.00	1.20
46	0.11	0.011	11.00	1.10
48	0.10	0.01	10.00	1.00
50	0.09	0.009	9.00	0.90
52	0.08	0.008	8.00	0.80
54	0.07	0.007	7.00	0.70
56	0.06	0.006	6.00	0.60
58	0.05	0.005	5.00	0.50
60	0.04	0.004	4.00	0.40
62	0.03	0.003	3.00	0.30
64	0.02	0.002	2.00	0.20
66	0.01	0.001	1.00	0.10

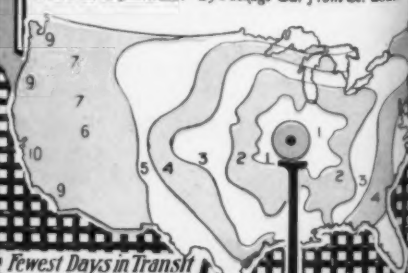
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- 1 COMPLETE WIRE CLOTH SERVICE
- 2 ACCESSIBLE WIRE CLOTH SERVICE
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- 4 ADAPTABLE WIRE CLOTH SERVICE
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Ludlow-Saylor Service is Nearest to Your Needs

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Baltimore, Md.	4	Louisville, Ky.	1
Birmingham, Ala.	4	Macon, Ga.	4
Butte, Mont.	6	Memphis, Tenn.	3
Chattanooga, Tenn.	2	Mobile, Ala.	3
Chicago, Ill.	1	New Orleans, La.	3
Cincinnati, Ohio	1	New York City, N. Y.	3
Cleveland, Ohio	2	Omaha, Nebr.	3
Columbia, S. C.	1	Philadelphia, Pa.	3
Dallas, Texas	3	Pittsburg, Pa.	3
Denver, Colo.	4	Portland, Oregon	9
Des Moines, Iowa	1	Richmond, Va.	4
Detroit, Mich.	2	Salt Lake City, Utah	6
El Paso, Texas	1	San Antonio, Texas	4
Ft. Wayne, Ind.	1	San Francisco, Calif.	10
Ft. Worth, Texas	3	Seattle, Wash.	9
Houston, Texas	4	Shreveport, La.	3

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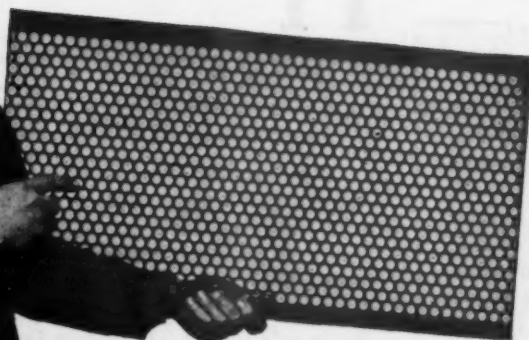
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We serve them better by keeping on hand Copper, Steel, Bronze, Brass, Tin, Aluminum. Ready to punch into any variety or kind of screen.

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W-Dent Shaker Plate, Patent 1920

U-Dent Shaker Plate, Patented 1915

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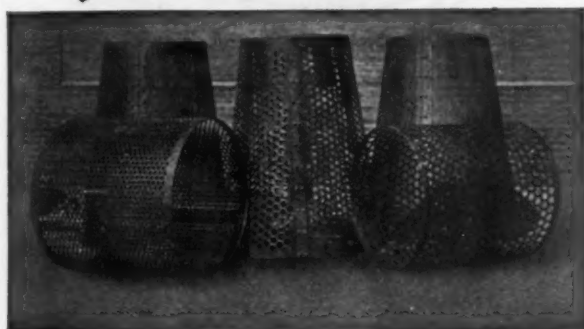
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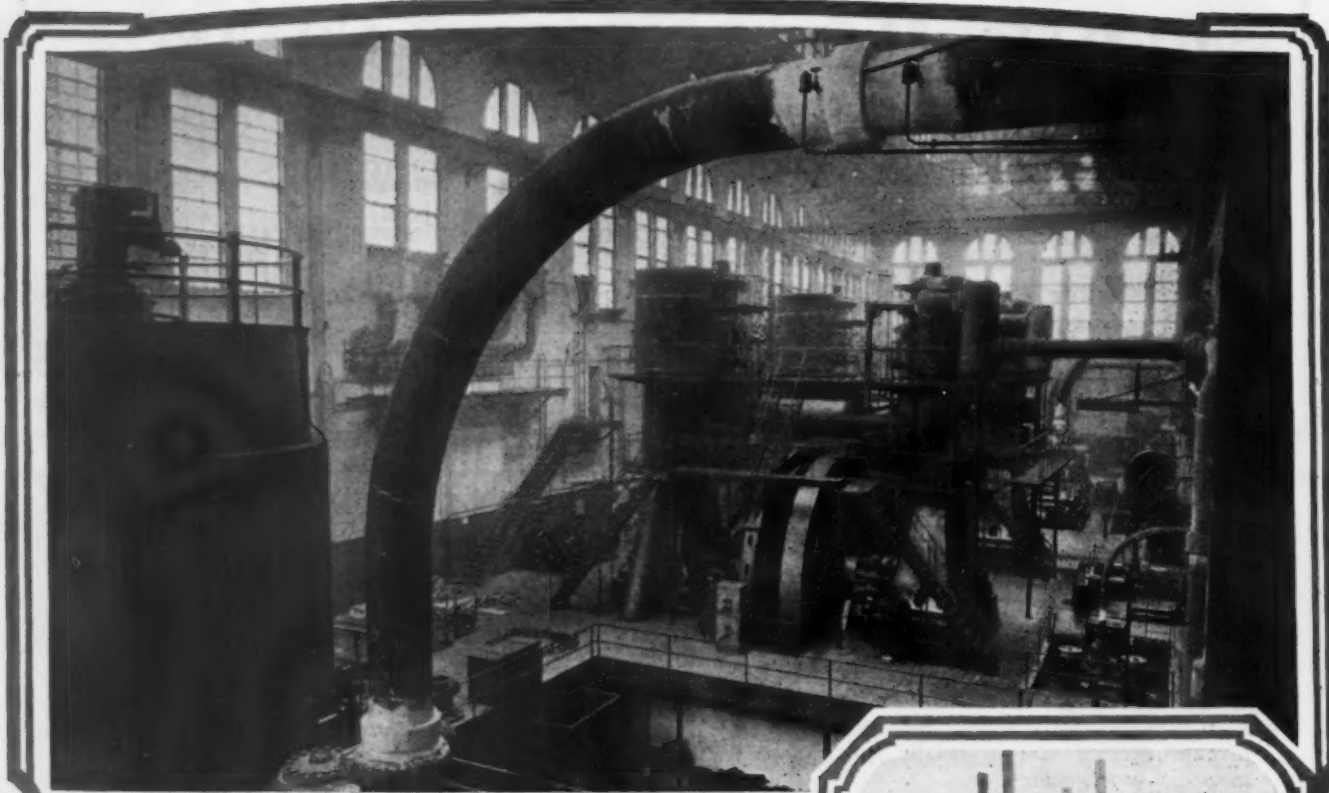
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That means we have not only the facilities to do the mechanical part, but also the experience and skill to make sure we are *right*—before we go ahead!

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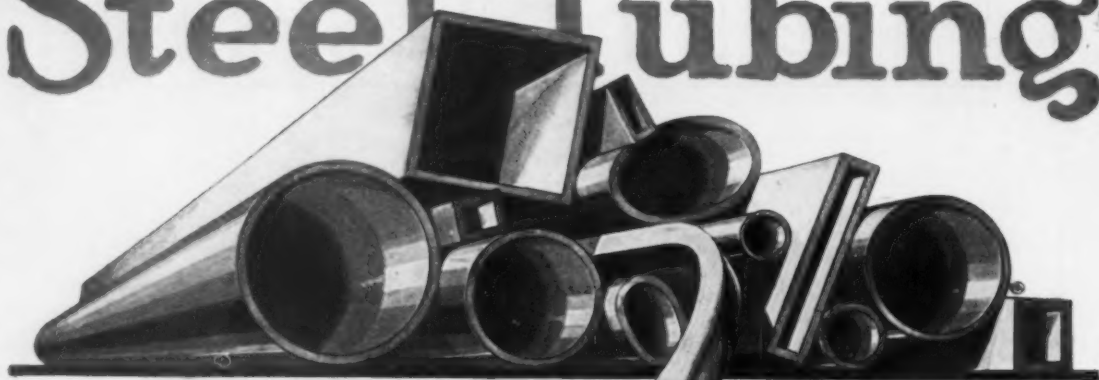
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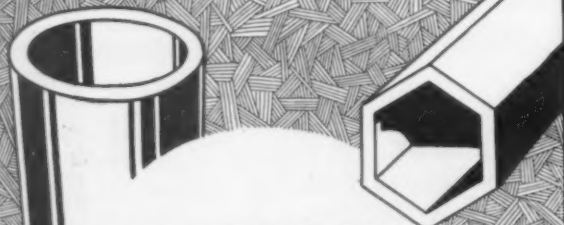
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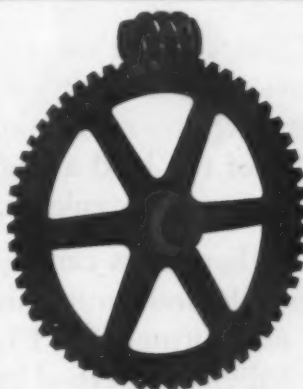
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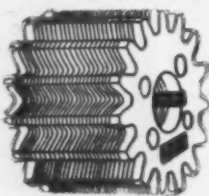
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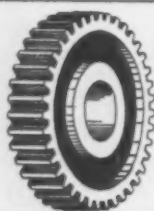


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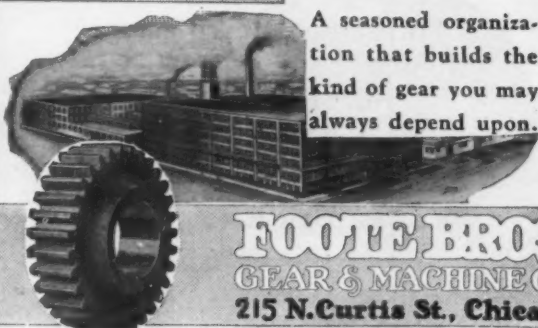
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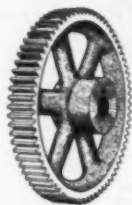
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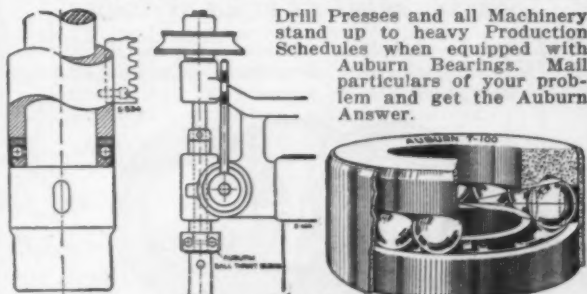
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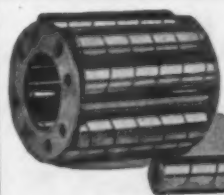


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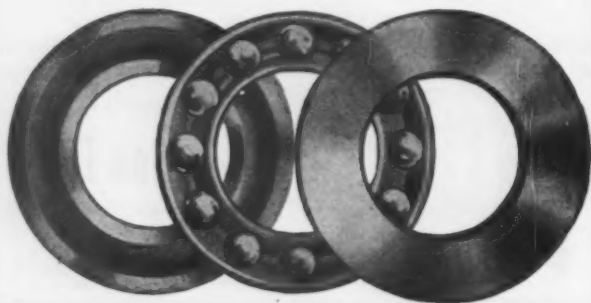
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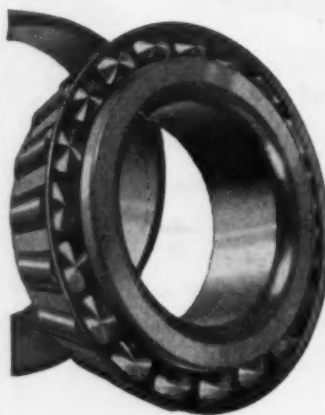
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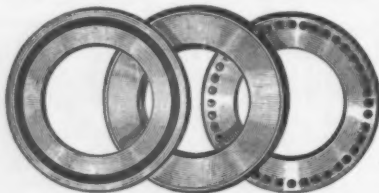
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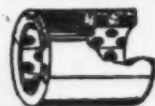
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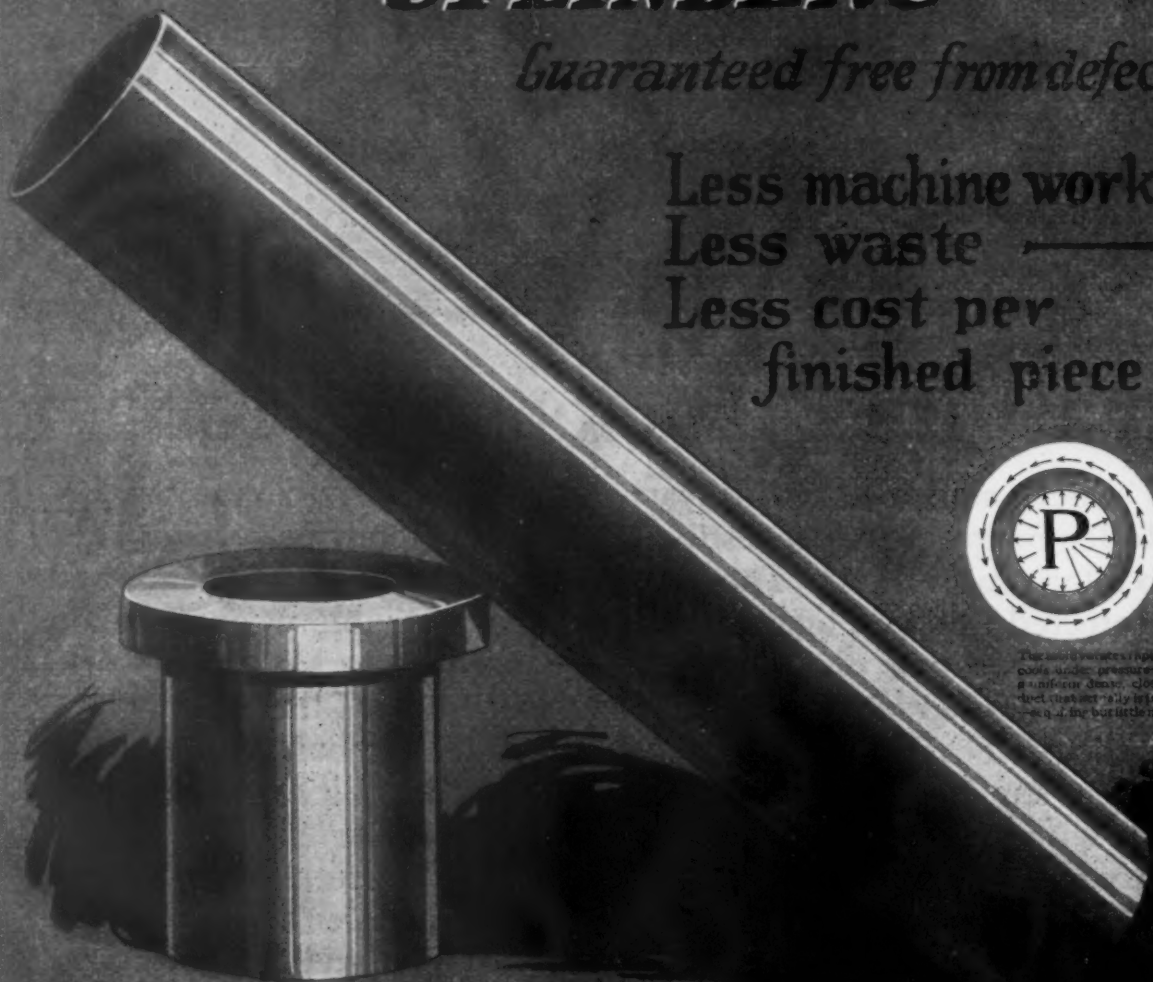
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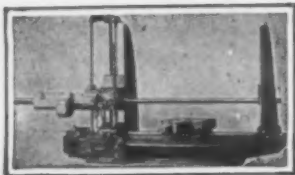
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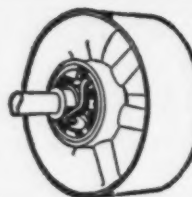
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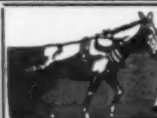
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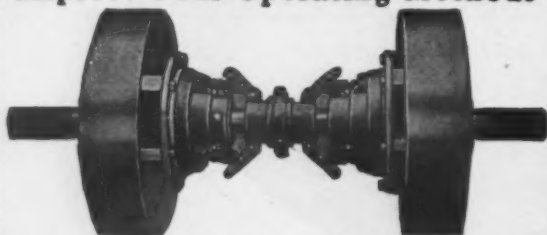
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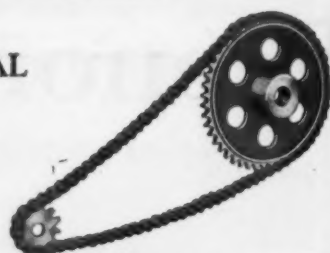
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AMERICAN High Speed
Chains and sprockets carried
in stock for all types of drives up
to 10 h.p., 7 to 1 reduction. 98
to 99 per cent efficient.

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CHAINS

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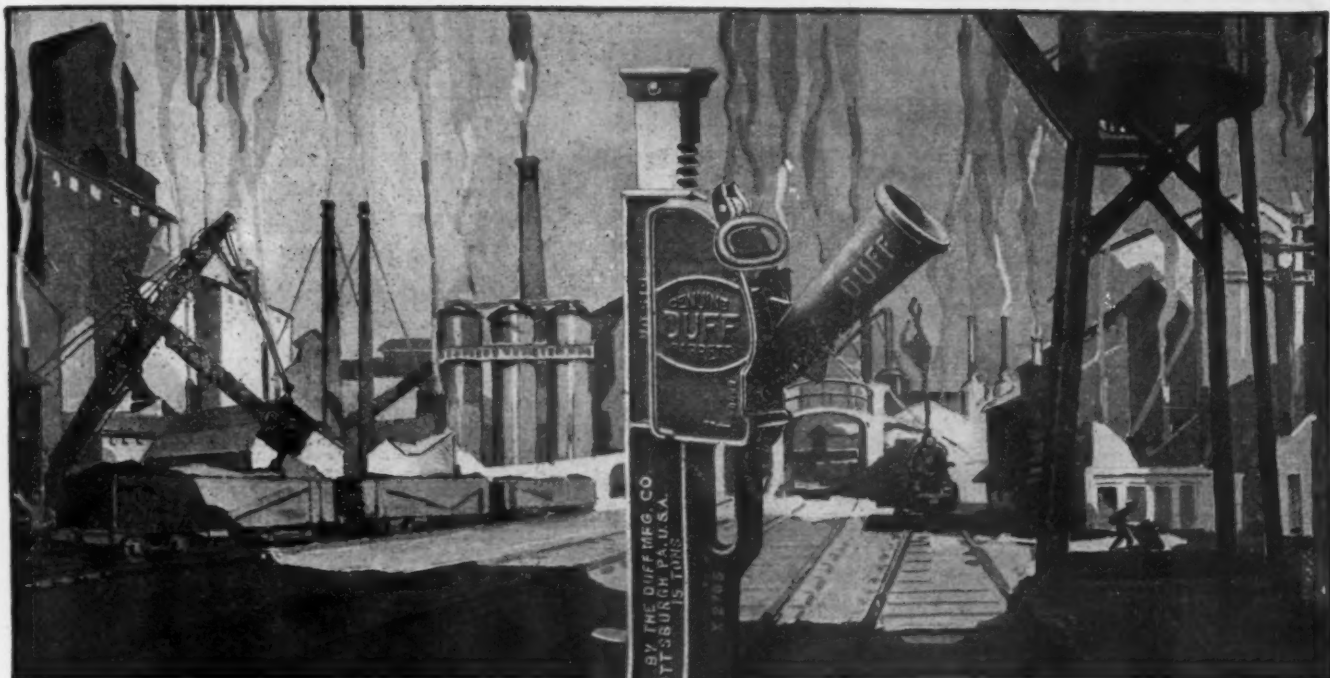
ELEVATORS
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"The longest service per unit of cost"

The Union Chain & Mfg. Co., Sandusky, O.

Registered
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BARRETT JACKS

know a lot about power

Barrett Jacks are known to every trade and industry. The makers, The Duff Mfg. Co., Pittsburgh, know how to make the most of power. That's their business. Perhaps that is why they chose Morse Silent Chains originally. This is what they say:

"As the world's largest manufacturers of lifting jacks, we must maintain a steady flow of production. An important step in guarding against production interruptions has been the change from belt to chain drives for driving line shafts from motors.

"Nine Morse Silent Chains, ranging from 5 to 30 H. P., drive line shafts at 300 R. P. M. from 900

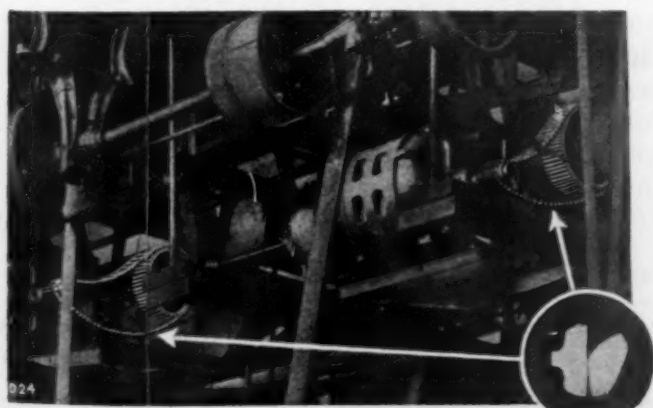
R. P. M. motors; the one exception is a 4 to 1 reduction from a 1200 R. P. M. motor.

"We have never had a breakage with Morse Chains, and their reduced maintenance pays for them many times over during their long life.

"In no instance would we replace chain drives with belts."

Morse Silent Chains, like Barrett Jacks, are serving practically every industry. Over 5,000,000 H. P. installed, one-tenth to 5000 H. P., 6000 to 250 R. P. M., centers down to 12 inches and lower.

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"So you fellows needn't worry about your pay envelope this winter no matter how hard the times."

And Mickey was right.

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And every Ridgway employee got his yellow envelope every pay day.

In times of business depression folks who know the money saving qualities of the Ridgway Elevator

"Equip With the Machine to Cheapen Production."

That is why so many

"Hook 'er to the Biler"

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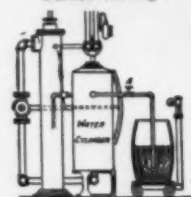
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Equipped with hook, bucket, clamshell or magnet, they can easily handle any kind of loose materials. Easily maneuvered on their Corduroy traction—no tracks required.

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EDGAR E. BROSIUS, Contracting Engineer, PITTSBURGH, PA.

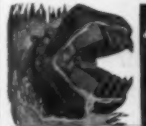


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Built to dig and stand the gaff of hard, continuous service.
Made in various sizes. Get our Bucket Bulletin.

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STEAM OR MOTOR DRIVEN
Capacities 15 to 40 Tons

To lower costs, Machinery, Method and Processes must be continually changed to produce quicker and better results.

The handling of material by manual labor is an expensive, slow and dangerous method.

Install a 15 or 20 ton OHIO Crane properly equipped and watch your handling costs turn to profits.

Lost demurrage charges are a big item in a year's time.

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**THE OHIO
LOCOMOTIVE CRANE CO.**

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THE name INDUSTRIAL on a machine stands for the ideals of the firm which built it, guaranteeing to owners all over the world the basic principles of honest workmanship which have made the name synonymous with all that is dependable and efficient.

Since the day of its inception fifty-three years ago, the INDUSTRIAL WORKS has been engaged in designing and building the finest material handling equipment in the world. The plant with its name has backed its products to the last.

INDUSTRIAL cranes and other products are built complete in INDUSTRIAL WORKS shops. This includes all units such as machinery units, boilers, cars, trucks, tractors, booms, tanks, etc. The highest standard of quality of materials is always maintained.

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INDUSTRIALS DO EXCEL!

INDUSTRIAL WORKS -- BAY CITY -- MICHIGAN

P

PICK the names of the leaders in any industry where heavy materials are handled. If they're using locomotive cranes at all, it's ten to one they're using Brownings. Why? Because Brownings have PROVED that they accomplish more and cost less

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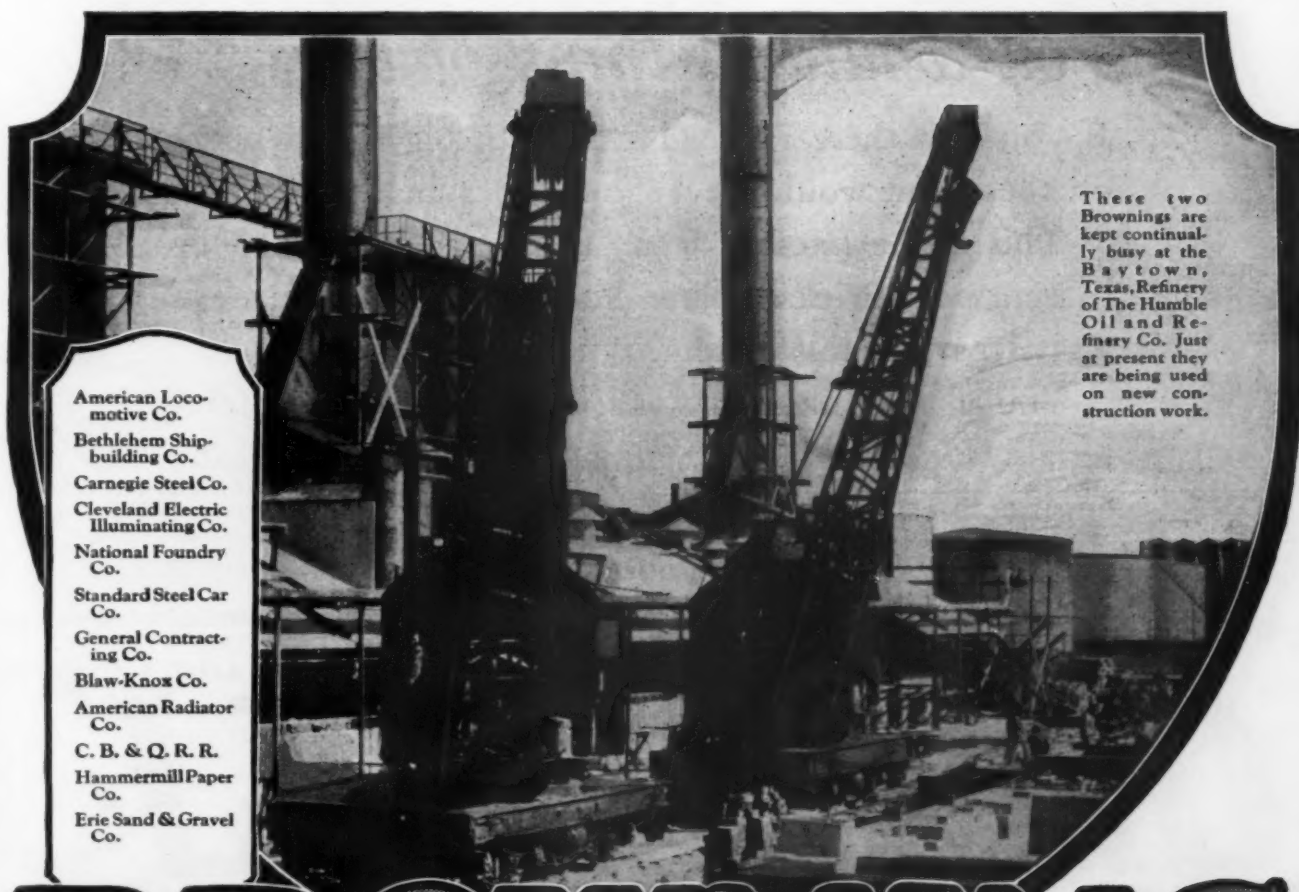
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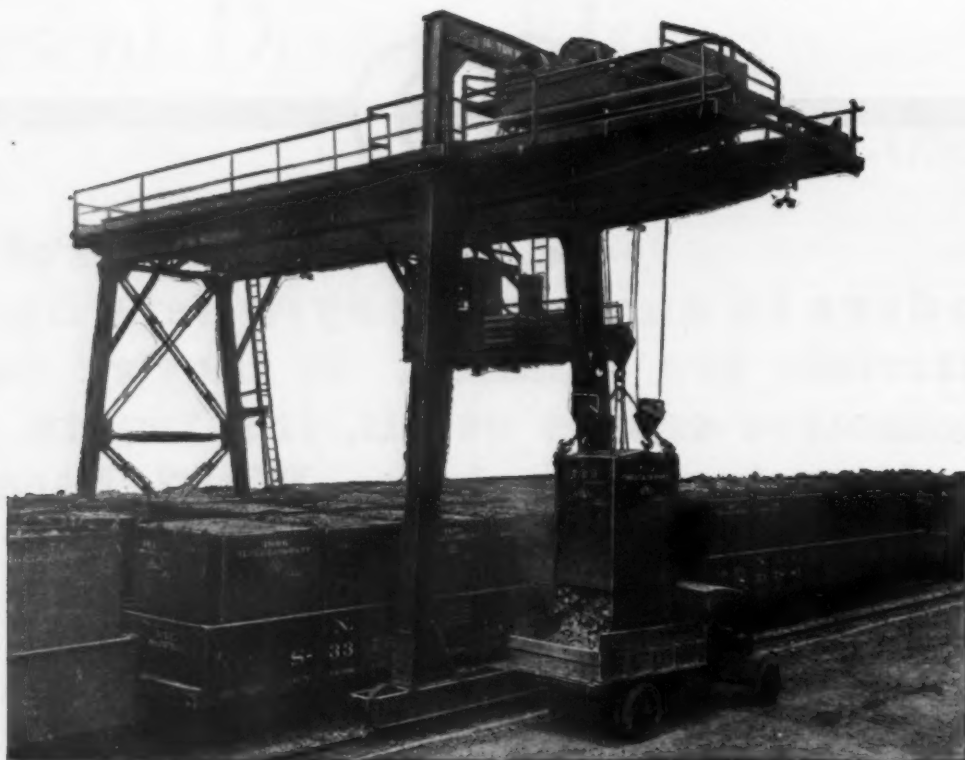


These two Brownings are kept continually busy at the Baytown, Texas, Refinery of The Humble Oil and Refinery Co. Just at present they are being used on new construction work.

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You wouldn't think of bricks , , ,

If you saw these railroad cars with big metal boxes on them you would never guess they held bricks.

This is the latest, the most modern, efficient way to transport bricks. And the Niles Gantry Crane is a vital part of this system.

You may think that your method of moving materials is good—and it may be. Yet if our crane engineers studied your work they might devise some quicker, more efficient plan.

Let them sit in with you when you are figuring on new cranes or replacements. Their time will cost you nothing.

Niles Crane Corporation

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NILES CRANES



WHEN Cleveland Cranes serve production machines, they immediately become an indispensable part of the manufacturing process itself. Your whole plant learns to depend upon Cleveland Cranes with the utmost confidence.

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Hand Cranes of all types. Overhead Trolley System

Efficiency **THE ARMINGTON ENGINEERING CO.** Economy
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We recently shipped a double trolley crane for hauling long beams in a steel Stock Yard.
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MARIS BROTHERS, INC. HAND CRANES

Electric Cranes—Hoists—Mono-Rail

Maris Hand Cranes are famous for their dependability and easy operation. Ask us for details.

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OVERHEAD OR GANTRY
FOR EVERY REQUIREMENT

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"Load Lifter" Electric Hoists
500 Pounds to 5-Tons
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Standardized Heavy Duty
Electric Traveling Cranes
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Efficiency
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ELECTRIC AND HAND POWER

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Electric Traveling Cranes, Charging Cranes, Ingot Strippers, Steam Hammers, Drop Hammers, Forging Presses, Hydraulic Presses, Rock Crushers, Rolling Mill Equipment, Locomotive Repairing and Rebuilding.

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Another Gift to the Industrial World
from the Standart Engineers

The New Northern Standartized Type "NE" Crane

Note these advanced features in
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TWO LOAD GIRT TROLLEY

One giving the very maximum of rigidity to trolley.

A rigid cast steel girt securely connecting the two side frames holding the trolley in rigid alignment. There is no live load stress on it.

The other carrying the load stresses.

A structural steel compensating load girt carries the live load directly into the trolley sides and is free to adjust itself to the varying loads and stresses.

Again—our advanced method of enclosing gears will interest you

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Class A
LO-HED
Electric
Hoist—
1/2 and 1 ton
Capacities

The Logical Hoist on which to Standardize

In standardizing on a piece of equipment there are two main factors that you want to be sure of:

1. That it is mechanically sound in design and construction.
2. That it will meet your requirements better than any other similar piece of equipment.

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From the standpoint of design and construction it is as fine a piece of commercial equipment as you will find on the market today. Here are some of the reasons: Mechanical efficiency over 80%; Hyatt Bearings throughout; fully enclosed, ball-bearing motor; automobile type spur-gear drive with drop-forged machine cut gears; alemite system of lubrication; sensitive control; all safety features; factor of safety of 5 at full load; highest grade plow steel hoisting cable; etc.

And in addition to highest quality it has *this* big patented exclusive advantage,—it operates in the minimum headroom.

Not only will the LO-HED give you years of trouble-free service, even under the most severe conditions, but it will also meet the greatest range of present headroom conditions and those that may arise in your shop in the future.

Certainly the LO-HED is the logical hoist to buy and to standardize on.

American Engineering Company

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"The Electric Hoist that operates
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Please write for
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ROEPER Electric Hoists

Lighten Labor and Increase Output.
Built in capacities up to 12 Tons.

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DETROIT HOISTS
Electric and Pneumatic Capacities 1/4 to 10 Tons
DETROIT HOIST & MACHINE CO.



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One ton and 1/2 ton types. Easily port-
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HANNA AIR HOISTS

Price is a small fraction of any
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LIFTING MAGNETS, COMPENSATORS,
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**Ohio LIFTING
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are indestructible

All insulation is Asbestos. They have maxi-
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P & H 15-ton, 100 Foot Span Double Trolley Mill Type Crane equipped with magnet trolley for skull-cracking service and bucket trolley for handling broken slag; owned by The Inland Steel Co., of Indiana Harbor, Ind. Other P & H equipment in this plant includes: a 2-ton grab bucket hoist; 2-ton grab bucket trolley; 15-ton, 50 foot span grab bucket crane; 5-ton, 28 foot crane; and another 15-ton, 100 foot span double trolley crane.

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THERE is no greater proof of confidence and satisfaction than repeat orders.

When The Inland Steel Co., of Indiana Harbor, Ind., purchased its first P & H 2-ton hoist in 1918 it was because of the P & H reputation for quality and service. How well this hoist made good is shown by the repeat orders that followed—first another hoist and then four large cranes.

Continuous, grueling service—fast speeds—economical operation—low maintenance; these are P & H qualities that breed confidence and appreciation and that result in repeat orders for such equipment as the 300,000 pound giant shown above—a fifteen ton capacity, 100 foot span, double trolley mill type crane, the latest repeat order from The Inland Steel Co.

Let us send you Bulletin 403, fully describing this equipment. Write for a copy today.

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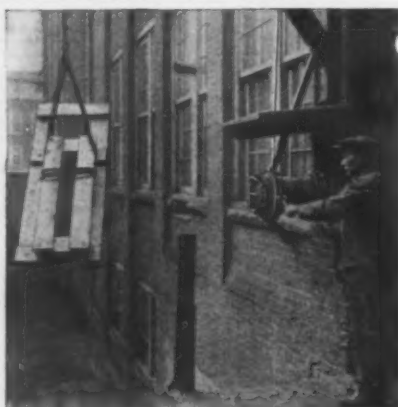
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Hoisting Timbers into the Building

Save Man Power in Lifting and Hauling

You can save man power and time on the little lifting and hauling jobs, by doing them with

SULLIVAN TURBINAIR HOISTS

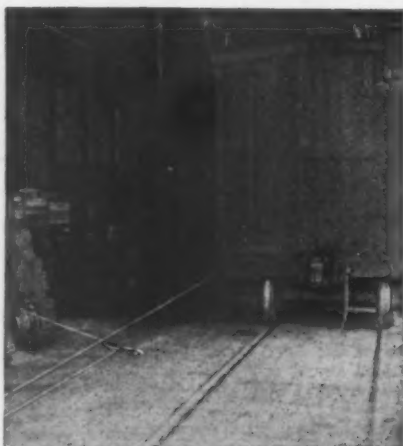
In one foundry, 4 of these hoists are used. One hoists patterns and lumber to an upper floor, one hauls freight cars in and out of the raw materials yard, one pulls full sand hoppers out on the molding floor and pulls empties back

under the mixer, and one hauls castings on a truck from one part of the foundry to another.

All small jobs, but performed many times a day.

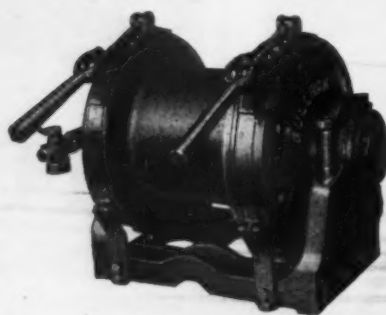
"Turbinair" and Electric Portable Hoists will haul a 100,000 lb. car on level track, or lift 2,000 lbs. vertically on single line. Single or two drum models.

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Moving Freight Cars

Sullivan Machinery Company
80 E. Adams St., Chicago



Sullivan Turbinair Hoist



Moving a Car of Castings in the Plant

TRIBLOC CHAIN HOISTS



No need to coddle these hoists!

In the busy shop there is no place for equipment that must be coaxed into giving quick, smooth and positive operation.

Triblocs need no coddling or coaxing to give their best—whether the work is in the grimy, dusty foundry or the extremely clean, bright food factory. The harder and dirtier the work, the more important the consistent service of Tribloc Chain Hoists becomes.

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FORD CHAIN BLOCK COMPANY
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We also manufacture "THE MOTORBLOC"
—an electrically driven chain hoist.

TERRY STEEL ERECTOR'S DERRICKS

Terry Derrick Fittings for
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AMERICAN-TERRY-DERRICK CO.
South Kearny, N. J.

It's gear driven!

Vulcan Iron Works, Wilkes-Barre, Pa.

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GASOLINE LOCOMOTIVES

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Gasoline Locomotives

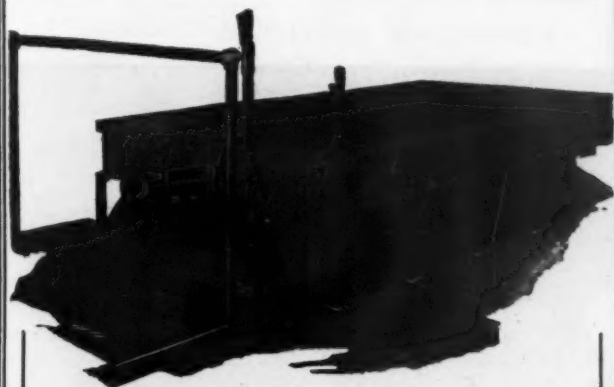
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40 H. P. Crawler
with Winch

THE J. T. TRACTOR CO.
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GENEVA SECURITY STEEL WHEELS

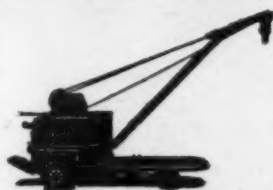


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Diameters 6" to 78"; Any Capacity, 2 lbs. to 12,000 lbs. per wheel. Made to your order.

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Electric Industrial
ELWELL-PARKERS
For interdepartment Haulage
TRUCKS and TRACTORS
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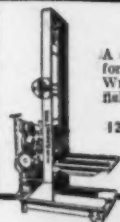
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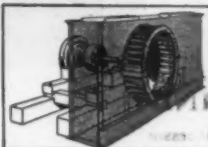
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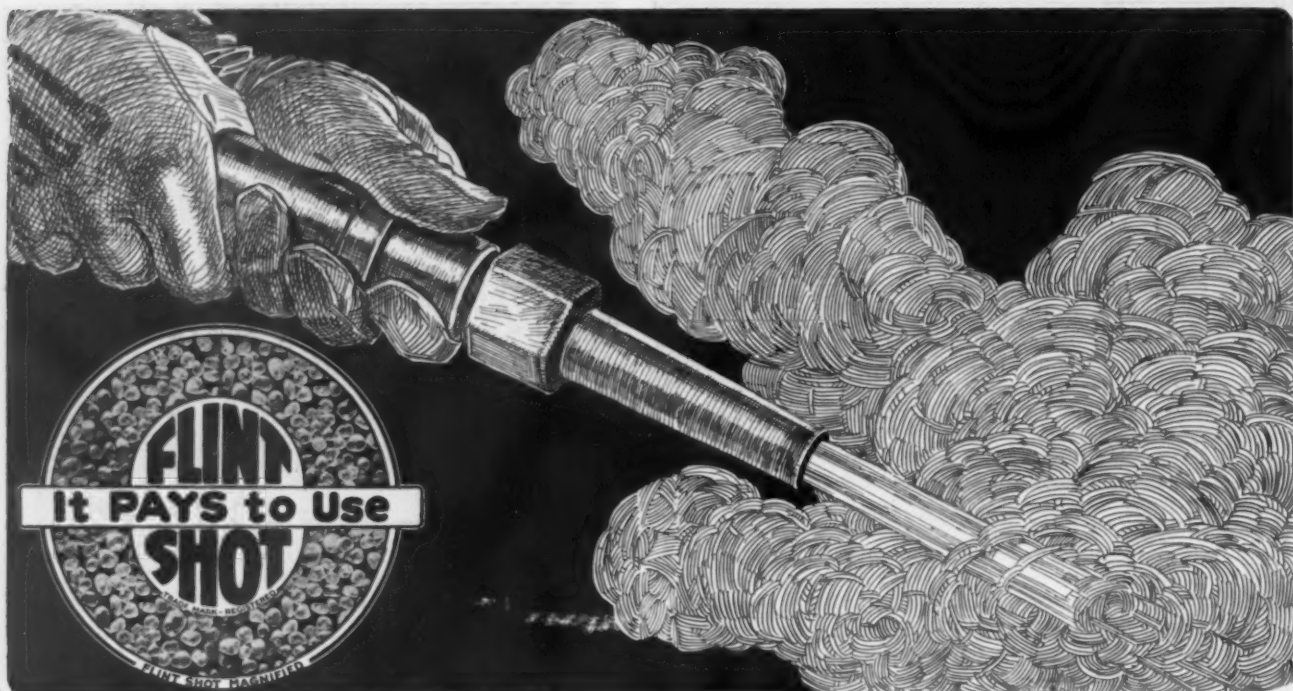
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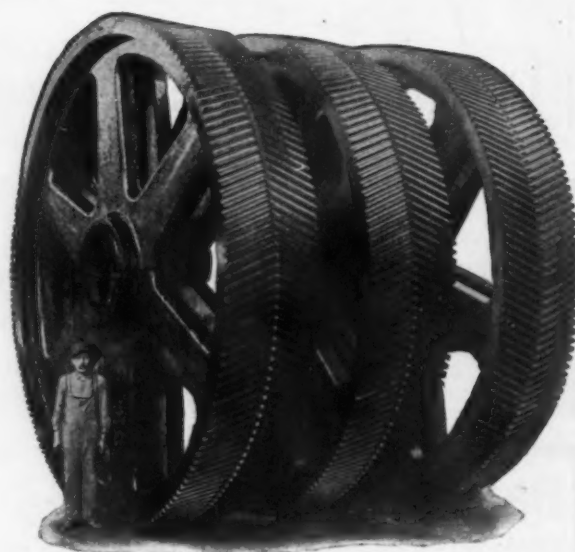
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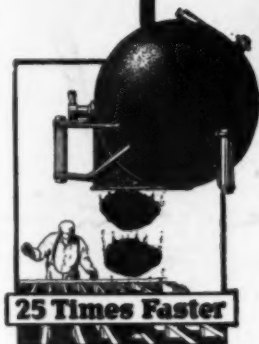
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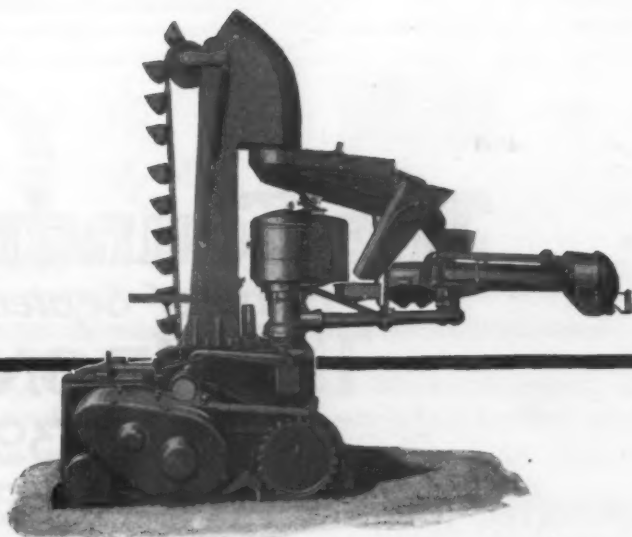
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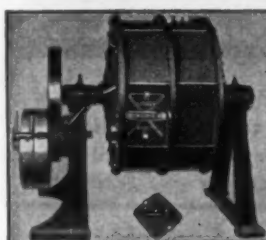
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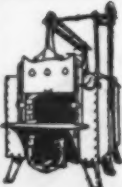
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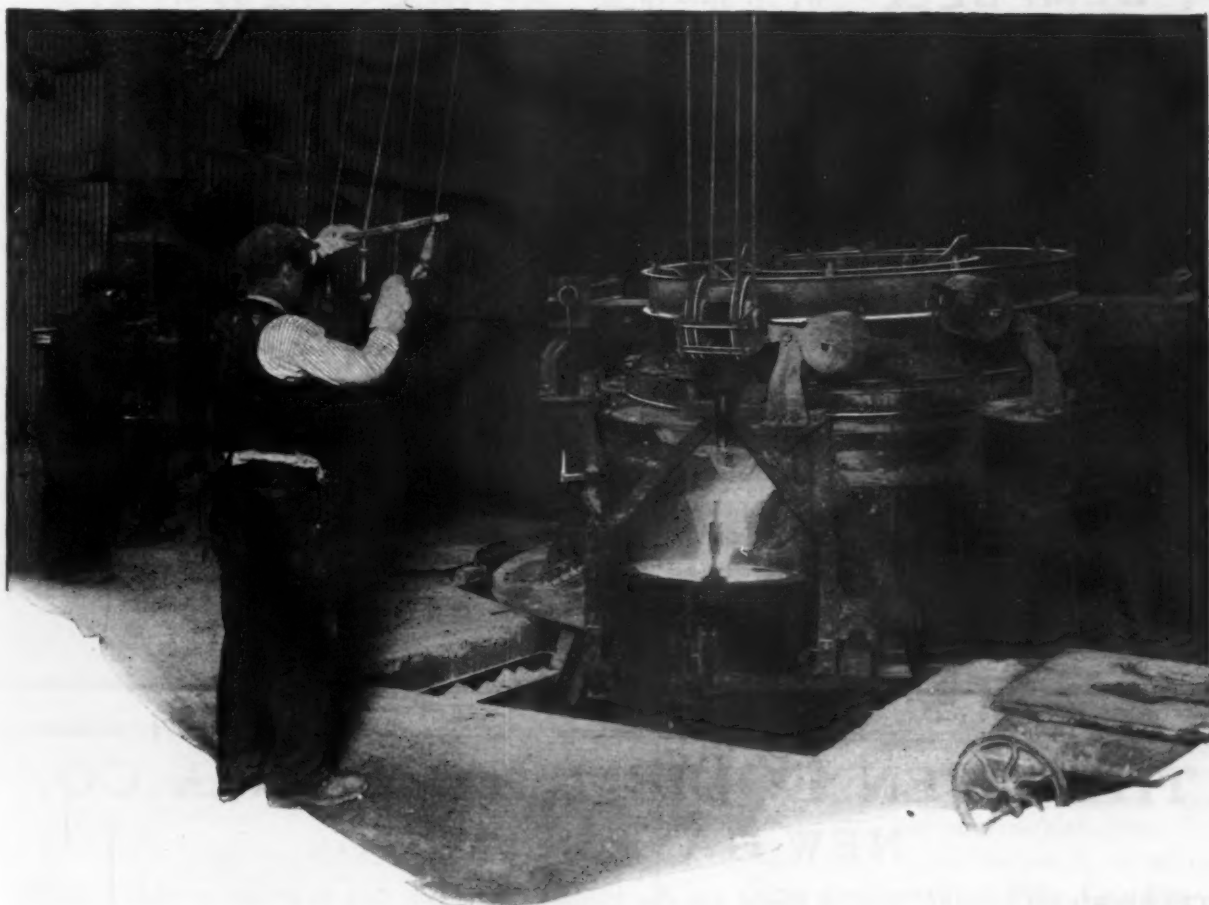

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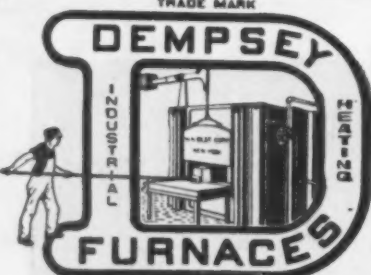
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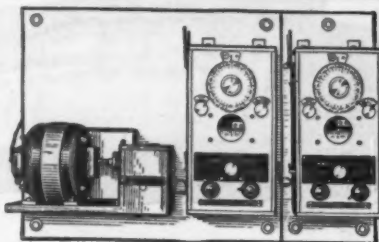
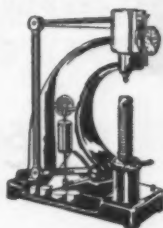
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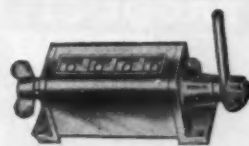
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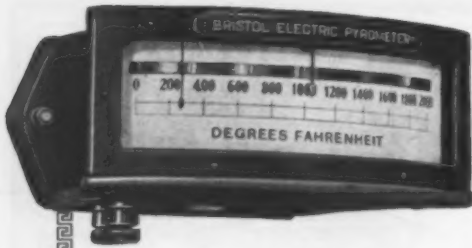
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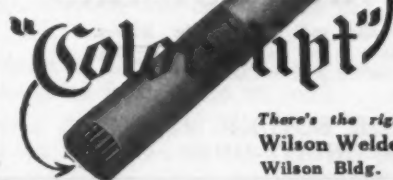
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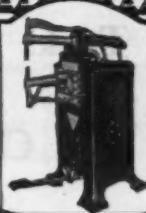
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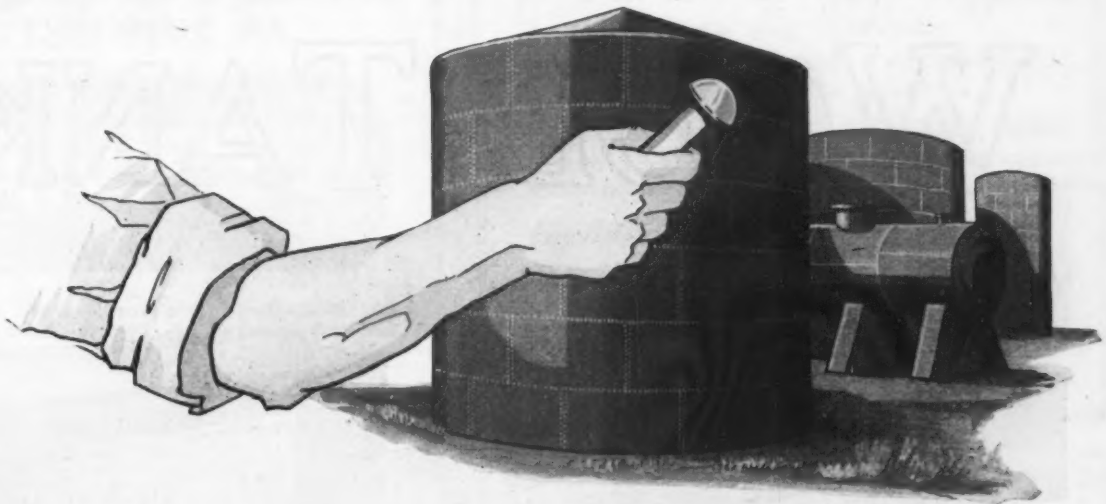
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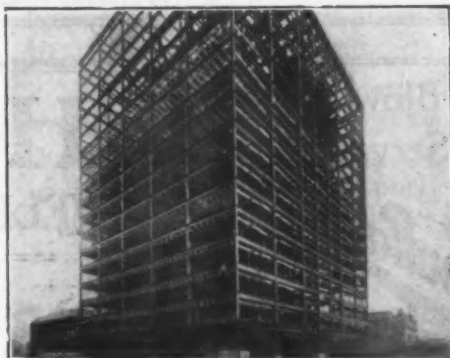
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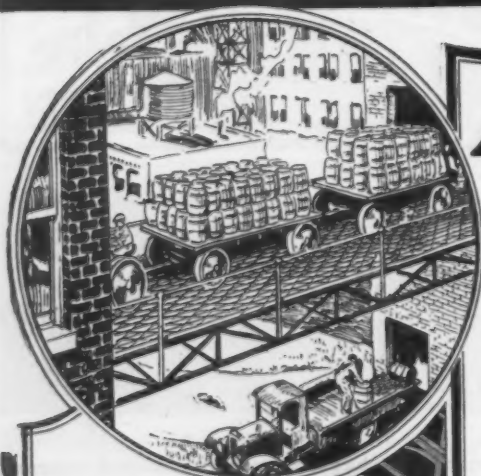
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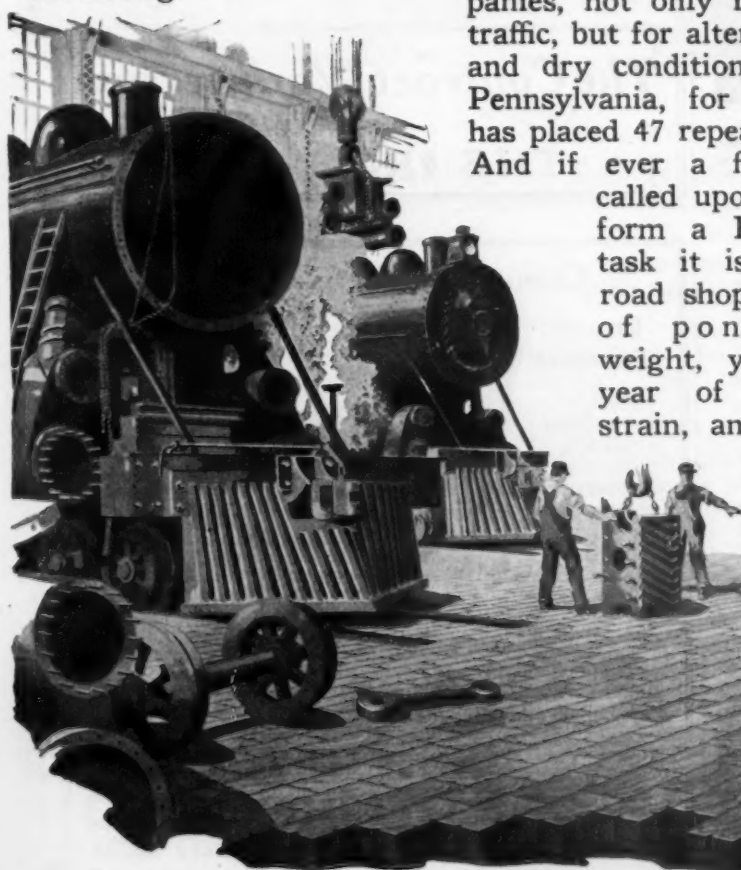
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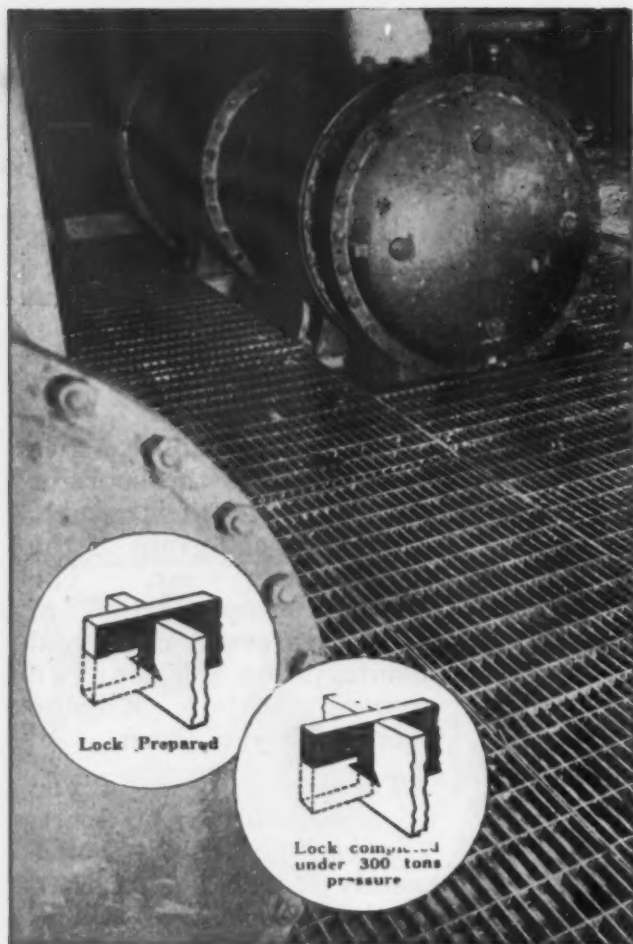


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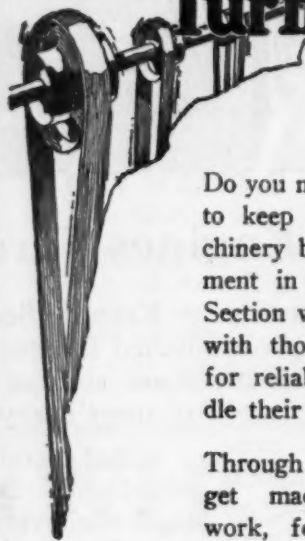
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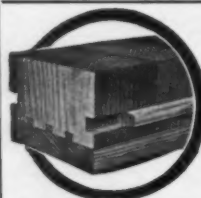
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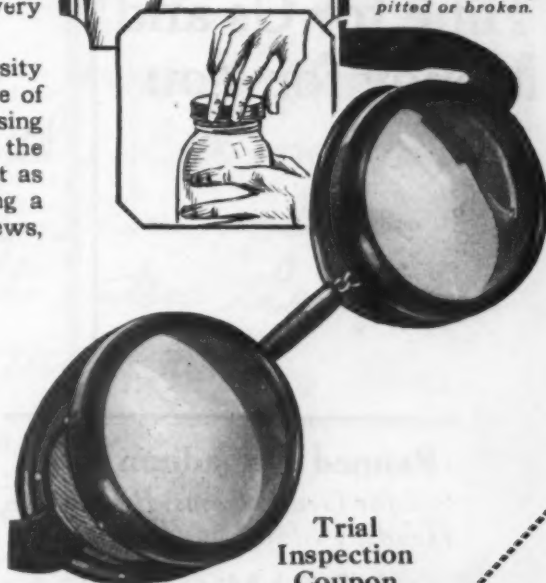
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One to Six Spindles
Tapping Attachments and Multiple Heads

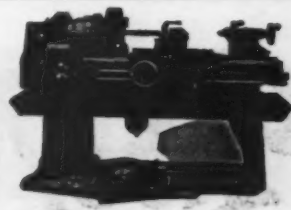


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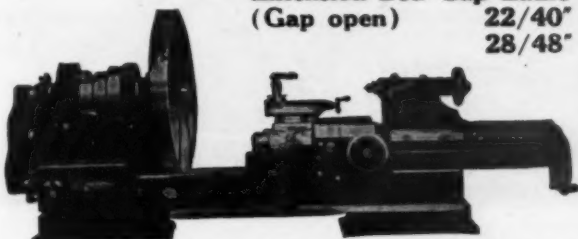


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28/48"

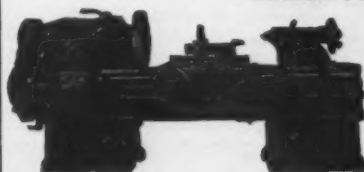


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Full Range of All Types
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Facing Reading
June 10th Issue

Hartness Flat Turret Lathes
Hartness Automatic Die Heads
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Fay Automatic Lathes
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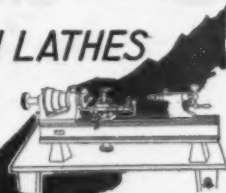
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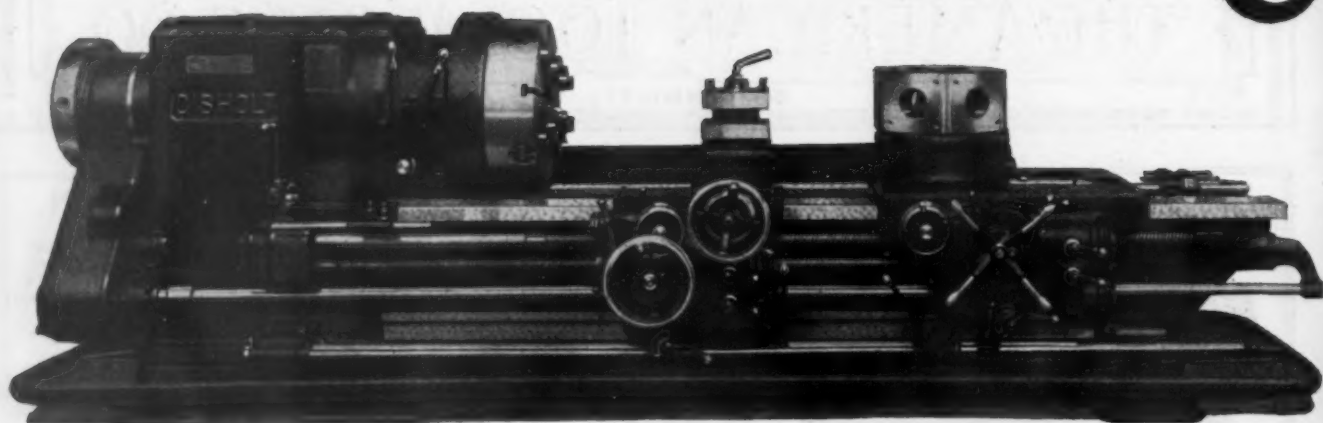


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Specify The **LUCAS** "Precision"

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The New Full Swing **Powerful**



5336

All Geared Head**Single Pulley Drive****Independent****Lead Screws****Feeds****Rapid Traverse****All Transmission Shafts****on Ball Bearings**

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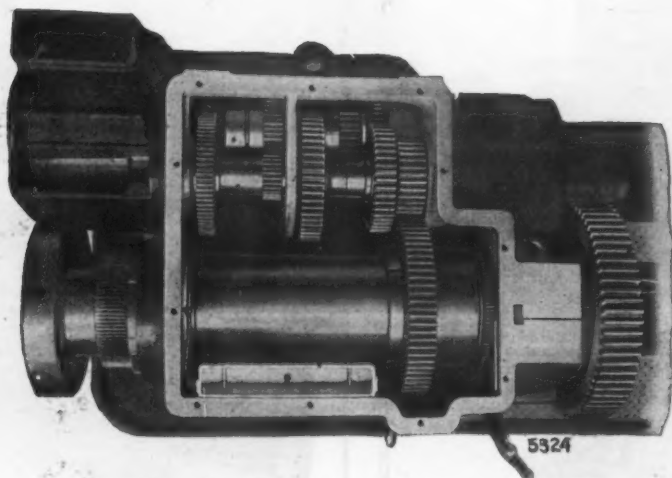
Swing over bed**Spindle bore****3L****21"****4- $\frac{5}{8}$ "****4L****28"****9- $\frac{1}{4}$ " - 10- $\frac{1}{2}$ " or 12- $\frac{1}{4}$ "**

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Productive



The bed, headstock and bearing housing are cast in one piece, the latter being bored taper for adjustment of bearings. The headstock walls extend above the top of the bearing housing forming an oil tight reservoir for the *splash oil system* and tying the whole unit rigidly together without joints or bolts.

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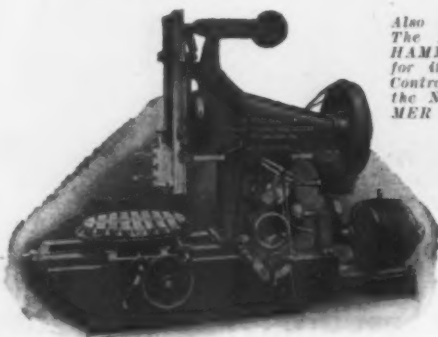
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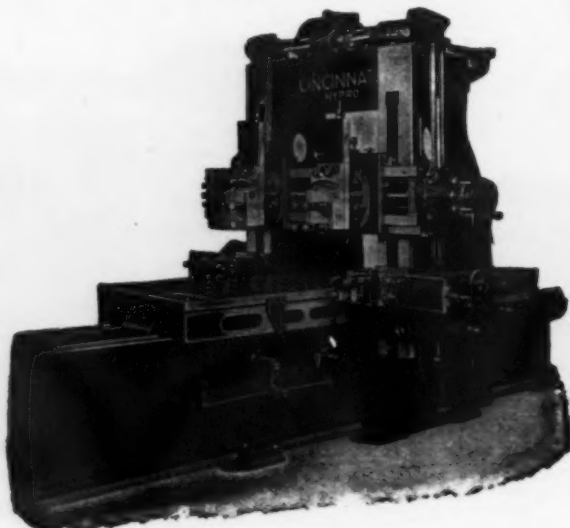


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Guaranteed to pay for itself in one year's time by in-
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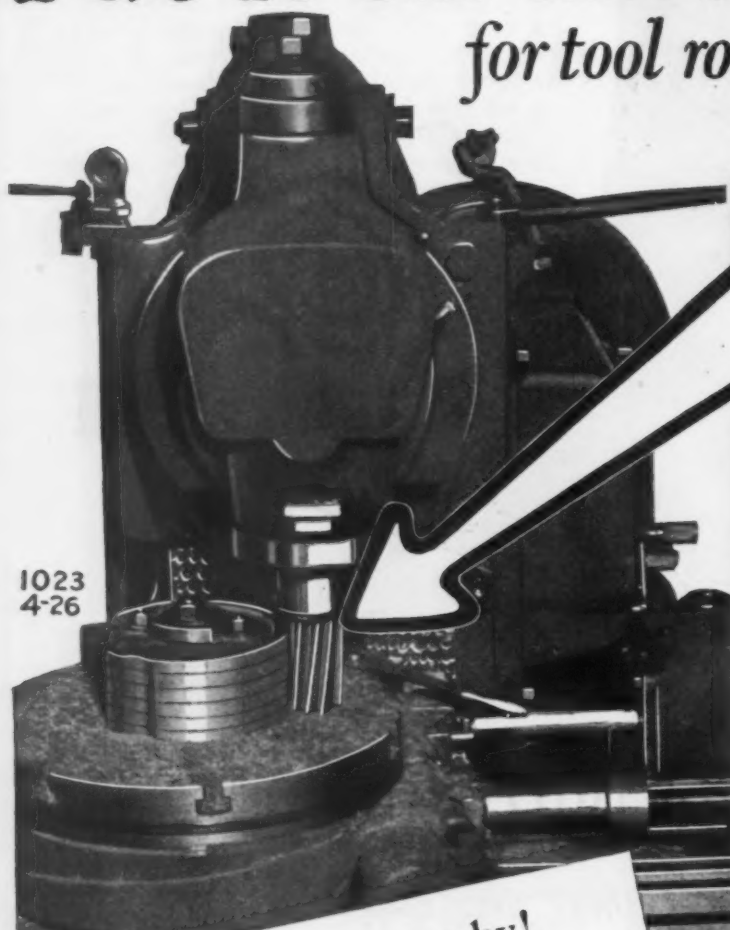
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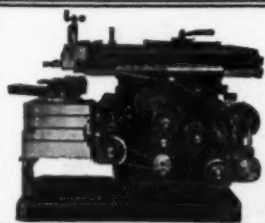
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UNIVERSAL GRINDING MACHINES

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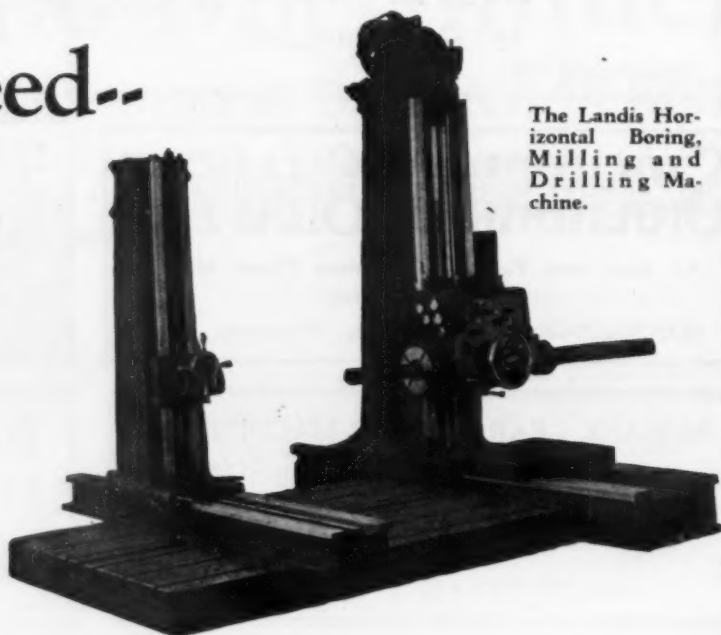
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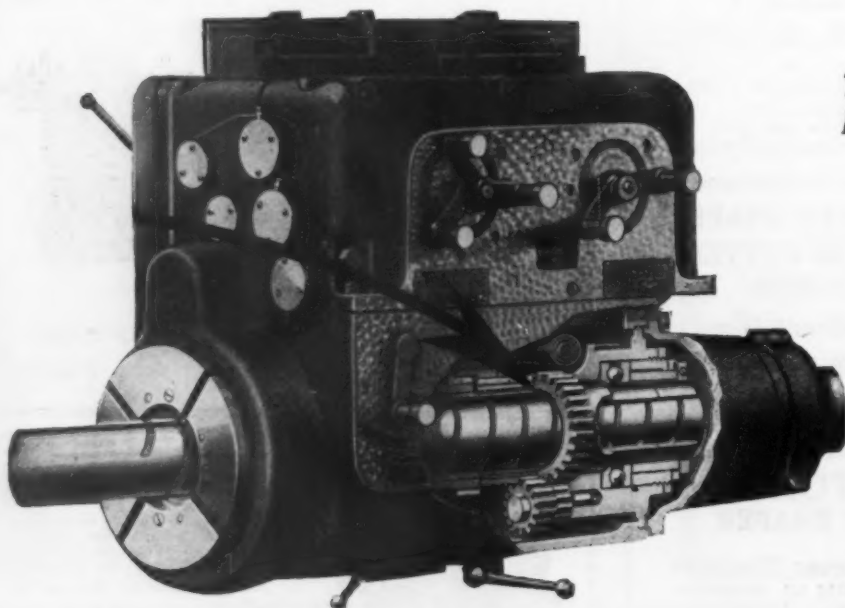
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The Landis feature—concentric screw feed to the spindle—is positive and sensitive. It provides a smooth feed and powerful drive at all times.

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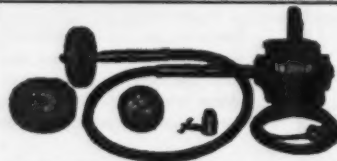


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Type
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when you consider the re-
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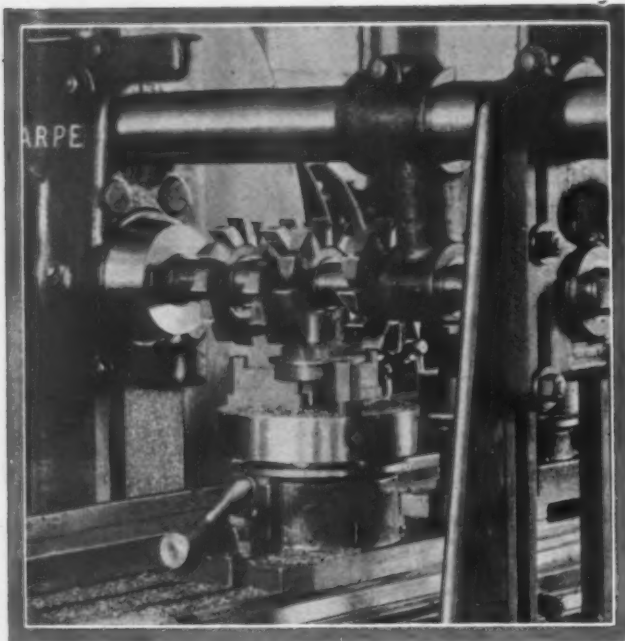
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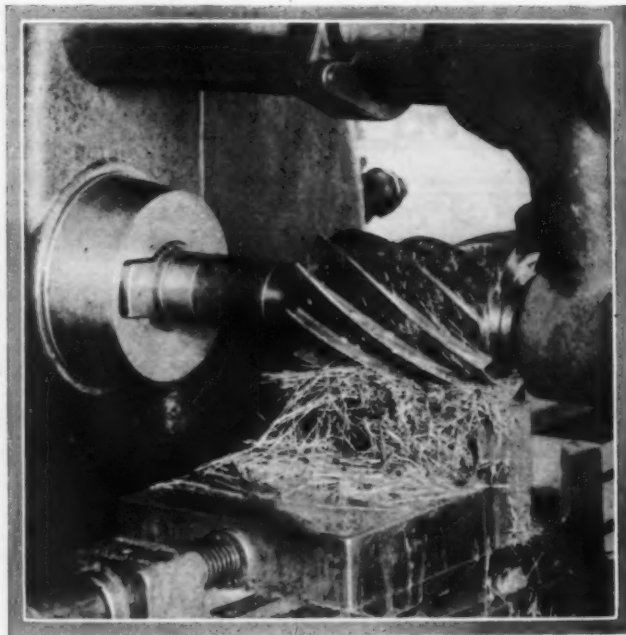
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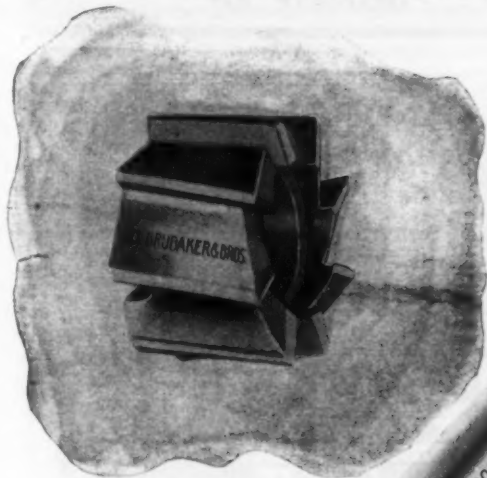
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MANUFACTURERS of MODERN MACHINE TOOLS, CUTTERS and SMALL TOOLS

No Excuse For Low Production When You Use Brubaker Tools



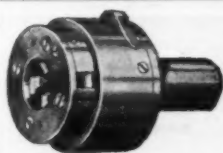
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REAMERS
END MILLS
STAYBOLT TAPS
SPIRAL INSERTED
BLADE REAMERS



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CUT THREADS
BETTER
QUICKER
CHEAPER

H & G
DIE HEAD

Sizes and Styles
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See our page of detailed information
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Dies—Self Opening, Adjustable
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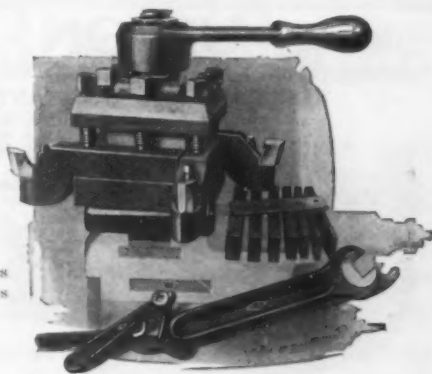
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Chucks save time!
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can be furnished in multi-spindle vertical, horizontal and turret type machines.

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"Old Hands"
Know Their Worth
Because
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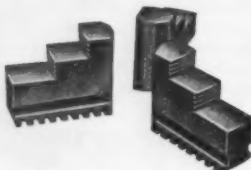
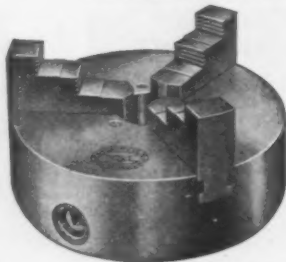
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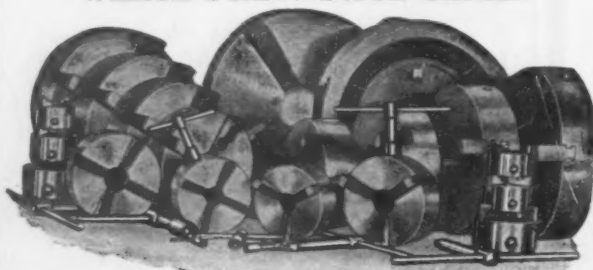
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They are available with either iron or steel bodies and in three or four jaw types. The "solid body" construction gives a rigid, accurate and durable chuck.

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We make the regular Huntington (Pattern) for all sizes. Roughing for No. 1 and 2. Paragon for No. 1 only.

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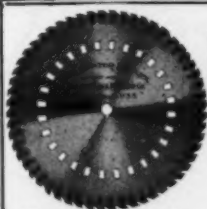
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AND STERLING GRINDING MACHINES

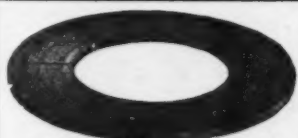


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Also High Speed Circular Metal
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Flexible Back Band Saw

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stand up under the
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Trial BAND or HACK SAW sent on request.



Tungsten Steel Hacksaw Blades.

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For cutting metal

A remarkable Disston invention—the Sectional Interlocked Saw. It cuts high-carbon steel rails and irregular steel shapes faster, reducing shop costs. This saw will be demonstrated in your plant without cost to you. Write for information.

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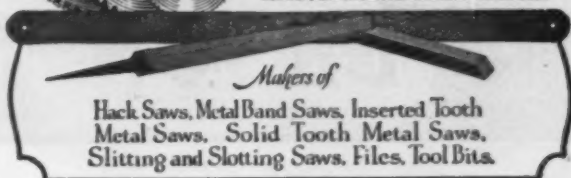
Improve your cutting results and
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SIMONDS Metal Cutting Band Saws.
These are the most dependable blades
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Teeth that bite!

TEETH that bite—steel. The blade of a Ryerson Friction Saw rips its way cleanly and evenly through structurals, bars or rails. No time lost in clamping, changing attachments or making adjustments. The Ryerson Friction Saw can cut more steel per day than any other machine made.

A Few Typical Cutting Times:

4 in.—7.7 lb. I-beam in.....	2.58 seconds
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100 lb. Rail in.....	11.40 "

Larger sizes cut maximum sections with corresponding speed. Smaller sizes fit the needs of the smaller shop.

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The Friction Saw is not only the fastest, but also the *cheapest* method of cutting. Ask for the facts.

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To ECONOMIZE

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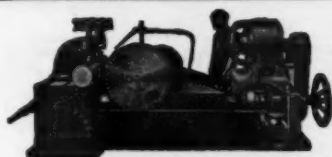
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Also Peerless U. S. A. Power Blades and the Peerless Duplex Hand Blades.

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THE ESPEN-LUCAS MACHINE WORKS
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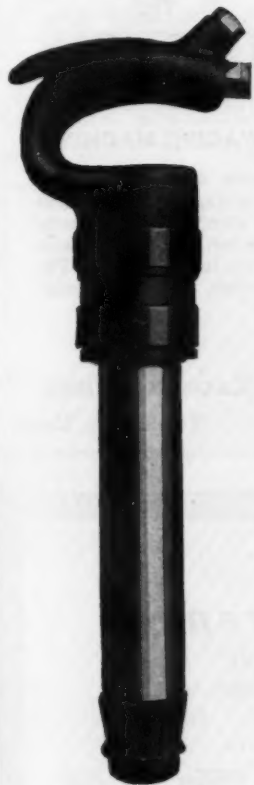


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We will prove it in your shop for 30 days. Write us.

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RIVETER.**
THE LIGHTEST,
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HAMMER MADE.

IT CUTS COST OF
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On the abutment job it is estimated that the Little Giant made possible a saving of \$30.00, while the price of the drill was saved more than twice on the roughing up.

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There is a Little Giant Electric Drill that will reduce your labor and repair costs. For full information write for Bulletins.

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Sales and Service Branches all over the World

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CHIPPING HAMMERS

Thor Size C Chipping Hammers are ideal for general chipping and caulking. They have a 3" stroke, give 1,600 blows per minute and use but 15 cu. ft. of air per minute.

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SLAG CUTTING-RIVET CUTTING

Save 50% of your labor cost by doing it the "Cincinnati Way" with the Cincinnati Slag Gun and the Cincinnati Rivet Cutting Gun. Practically all Steel Mills and Railroads have adopted the "Cincinnati" as Standard. Write for catalog of installations.

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"NEW PROCESS" PUNCHES

do double the work of any other punch. They save you the time and inconvenience of broken punches.

Shipped on approval.

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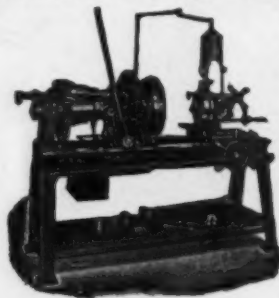
**If We Can Get You
to try our tools the job is done.
Our customers stay with us.**

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STEEL TOOL

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Pipe Threading and Cutting Machinery. The quick-acting lever gripping chuck type are equipped with Nipple Threading Attachments and Expanding Die Heads and are made in four sizes.



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Production—Precision—Portable

Latest and Most Advanced Types on the Market
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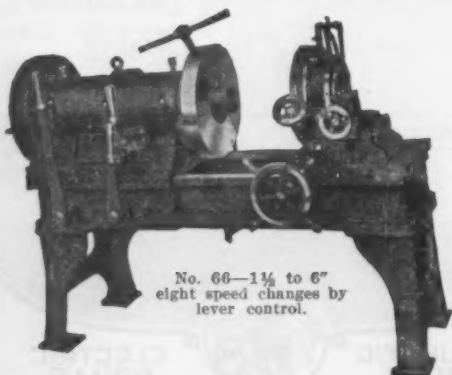
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SWAGING MACHINE

—with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."

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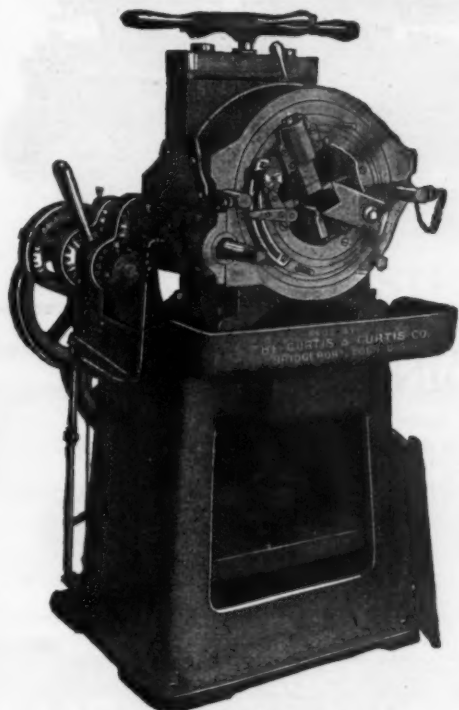
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eight speed changes by
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**They DO make a
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Direct Connected Electric

All public service corporations must use particular care in the selection of equipment, for their ability to render the proper service depends greatly on such selection. For this reason a large number of the leading railroads, central stations and construction companies all over the world are using Curtis Equipment.

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Complete line HAND—BELT—ELECTRIC
Ranges $\frac{1}{4}$ -2" to 8-16". Our Engineering
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The Curtis and Curtis Company
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MOST THREADS PER DOLLAR INVESTED

Yards of pipe threading in the same time that was once required for feet

LOWER DIE COSTS:
For instance, a set of dies covering the range from 2 $\frac{1}{4}$ to 6 in. costs your plant only one-third to one-quarter as much as with the old type machine.

Hold your watch on a Rapiduction. This machine turns out three feet of pipe threading in less time than it takes the old type machine to do one foot!

Time the changes from one pipe size to another—and be prepared for another surprise. Takes less than a third the time

**—and one Rapiduction Die Head covers
the entire size range**

Don't put your watch away until you have timed the changing of a chaser bit in the Rapiduction Die Head—less than a twentieth of the time it takes to replace a complete set in the old type machine.

After you have timed a Rapiduction, you will certainly want to try one. Such time savings as these are as valuable to you as to anyone else.

As a starter, drop us a line for our bulletin giving the details of this machine and time studies on its production.

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RAPIDUCTION
POWER PIPE MACHINE**

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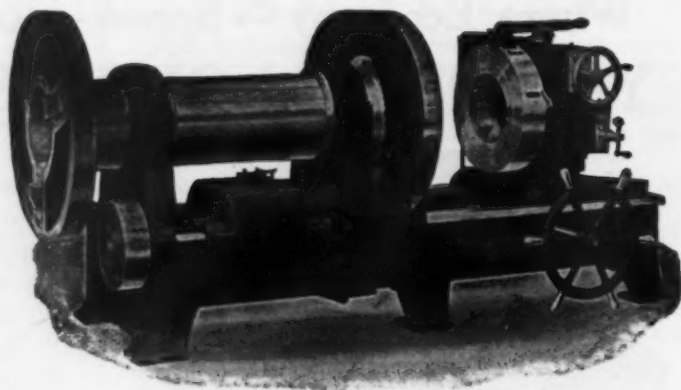


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B. & K. Pipe Machines

will give you the finest, cleanest threads you ever experienced. And not only better threads but more threads in a given amount of time. Our new bulletins are ready.

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Quality of thread and big production at low cost are the results of installing Coulter Automatic Threading Machinery.

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Manufacturers and Designers of Special Machine Tools

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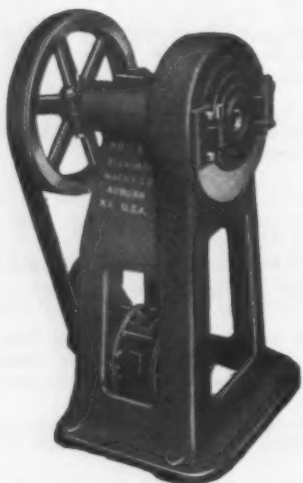
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WIRE DRAWING AND HANDLING EQUIPMENT.
FOR STEEL, COPPER AND ALLOYS.

"STANDARD" MACHINES Are a Profitable Investment



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—Featuring—

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All Wearing Surfaces Renewable
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Wire Drawing Machines
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Complete Equipment for the Manufacturing of
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Handle Your Wire at Small Cost

INSTALL A SHUSTER AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, direct motor driven, or belt driven.

Buy your wire in coils, have an unskilled laborer start them in the machine, and the machine does the rest. Makes it perfect-

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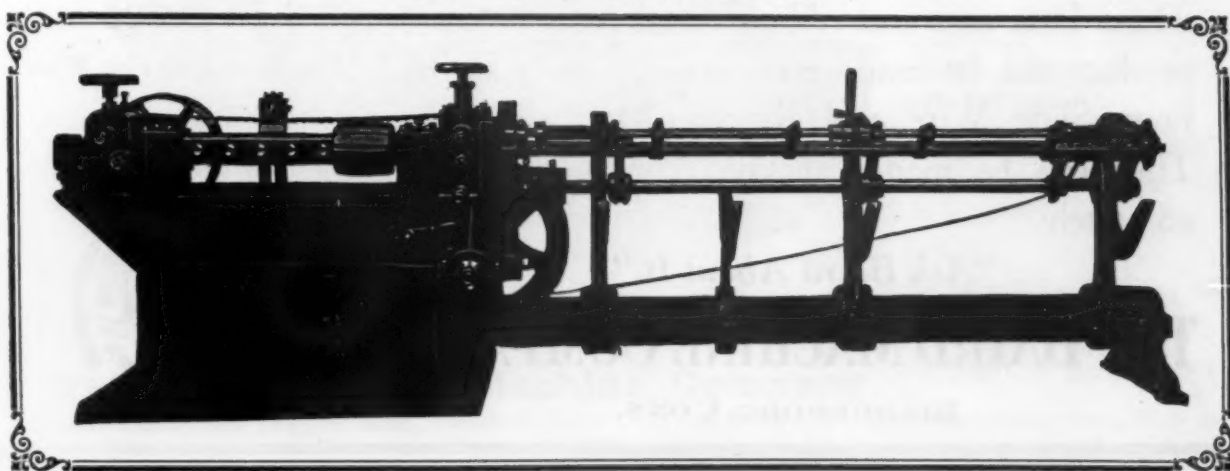
We shall be glad to furnish production figures, if you will advise the diameters and lengths you use.

THE F. B. SHUSTER COMPANY, New Haven, Conn.

Formerly John Adt & Son

Established 1866

STRAIGHTENER SPECIALISTS



The Nilson Tilting Wire Reel in vertical position.

Foot-trip at base releases wire-carrying section to allow it to be lowered. Upright lever is pulled to release lock after coil is adjusted.

One man can do the loading.

Increase the output of your wire-forming machines, decrease the cost of loading, and eliminate the danger of accident by installing the NILSON TILTING WIRE REEL at once.

Send for booklet giving illustrations and descriptions.

You Can Make Light of Heavy Lifting with the NILSON Tilting Wire Reel

Don't waste time, risk toes and lose temper loading wire reels in the old laborious way by lifting the heavy coil—let the reel do the work. The Nilson Tilting Wire Reel is the most efficient and easiest operated wire reel made. The wire-carrying section lowers to allow the coil to be shoved upon the prongs, then with little effort it is returned to the vertical position, a counterbalancing weight relieving the operator from heavy lifting.

The reel automatically locks in both positions. A foot trip releases it to be lowered and a lever unlocks it when the coil is in position.

The reel can be adjusted horizontally for feeding flat wire.



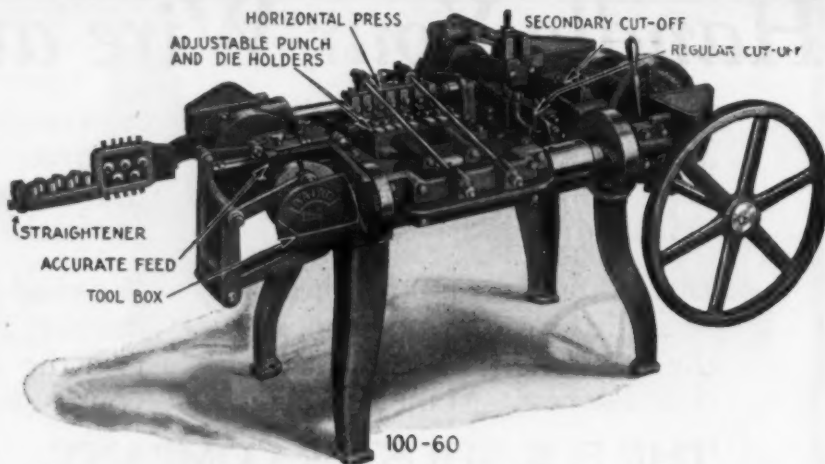
Loading the Nilson Tilting Wire Reel. One man can easily place the coil in position.

When the reel is in this position it is locked automatically. It cannot fly back and endanger the workman.

The A. H. Nilson Machine Company, Bridgeport, Conn.

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Four Slide Wire and Ribbon Metal Forming Machine



Dependable, Fast, Economical

Those little wire and ribbon metal parts in your product can be made inexpensively on a Baird Four Slide Wire and Ribbon Metal Former. They can be made quickly, economically and accurately.

"Ask Baird About It."

THE BAIRD MACHINE COMPANY

BRIDGEPORT, CONN.

11 Sizes

For Round or Flat Wire



KANE & ROACH

NIAGARA & SHONNARD STS., SYRACUSE, N. Y.

STRAIGHTENING MACHINES
BENDING MACHINES, Hand and Power. HAMMERS, Power
SHEET METAL MACHINERY COLD ROLLING MACHINERY
SPECIAL MACHINERY PUMPS Centrifugal and Hydraulic

Bolt Threaders, Nut Tappers, Heading Machines, Etc.

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Let our Engineering De-
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Send your specifications today

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COOK CAP SCREW MACHINES

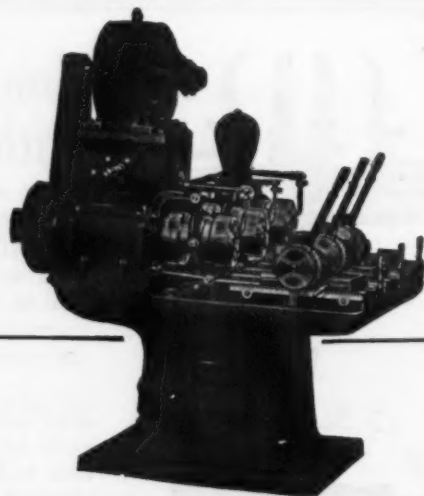
for shaving CAP SCREWS under and over the head in one
operation.

COOK WOOD SCREW MACHINES

for making IRON AND BRASS WOOD SCREWS

THE ASA S. COOK CO., HARTFORD, CONN.

Under the personal management of JOHN F. COOK



NATIONAL BOLT CUTTERS

"Always Cut Accurate Threads"

Do not require skilled labor.

Dies can be changed or adjusted in a minute's
time.

Die Head has a positive lock, hence insures
uniform diameter and accurate thread, regard-
less of stock variations.

The National interchangeable Case Die insures
30% to 50% less upkeep cost.

Thousands of satisfied users will attest the
National has no equal.

Don't buy a Bolt Cutter without thorough
investigation of the National.

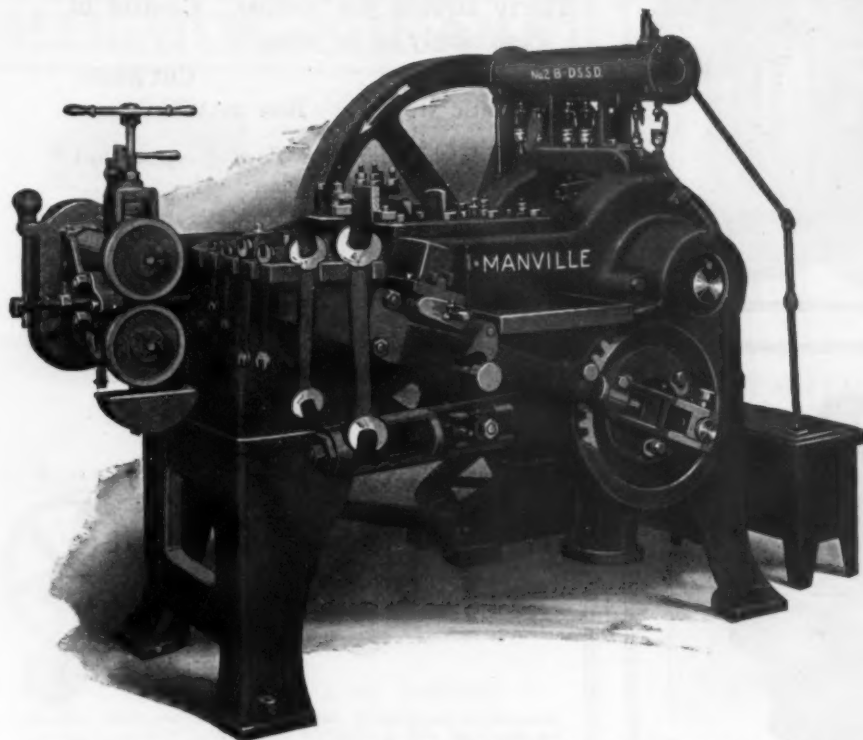
Built in 22 different sizes and styles.

THE NATIONAL MACHINERY
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MANVILLE DIRECT-ACTING B-MODEL DOUBLE-STROKE SOLID-DIE COLD HEADERS



Are Powerful,
Rigid, High Duty
Machines and
Possess *Excessive*
Heading Power

For the rapid production of Machine, Lag, Cap, Stove, Tire and Wood Screw Blanks, Rivets and Special Heading the **Manville** Two Blow Headers are unexcelled.

It produces continually from the time you belt it up.

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Rivet, Bolt and Nut Machines, Power and Hydraulic Presses, Multiple Plunger "Eyelet" Machines. Machines for cold rolling and drawing sheets, rods and wire.

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The MARVEL No. 23 Punches, Shears, Notches, Bends

This sturdy device is practically a complete metal working shop in itself. It fits the needs and the space available in *any* shop.

Let us tell you what it will do—we can probably save you the cost of larger and more expensive equipment.



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"Whatever the Riveting, there's an ALLEN for the job."

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where you
Punches



Difference
buy your
and Dies

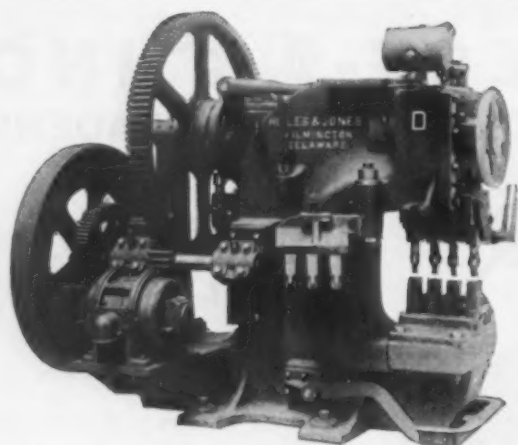


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ANGLE PUNCH

for rapid production

Thirty strokes per minute. Control of gags singly or in pairs.

Hinged stripper.

Cut gears.

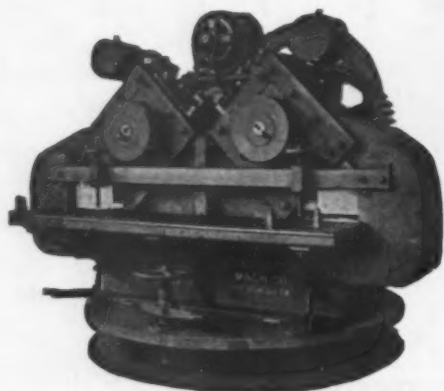
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Box section frame.

Consolidated Machine Tool Corporation of America

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ANY ANGLE UP TO 45°

The Thomas Double Angle Shears will make square cuts or mitre to any angle up to 45°. As an example of the thought that is given to all details in the construction of these machines, the shear blades are made reversible, thus giving four cutting edges.

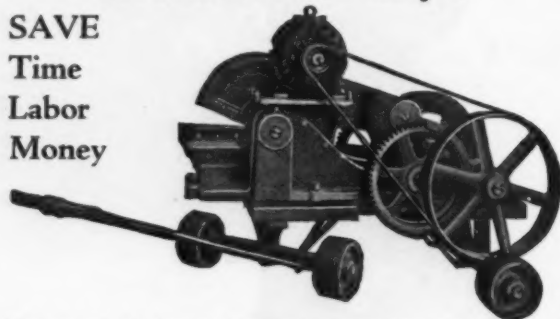
Punches and Shears
Multiple Punches
Gate Shears
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Angle Bending
Machines
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Take the Shear to the Job

SAVE
Time
Labor
Money



Why use up the time of three or four men when *one man* can do the whole job with a CANTON PORTABLE SHEAR? Write for details about capacities and models.

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POWER SHEARS ROOFING MACHINERY

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SOLID STEEL **WAPAKONETA** LAID STEEL

SHEAR BLADES

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INCORPORATED 1891
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PUNCHING MACHINERY **BEATTY** SHEARING MACHINERY
PORTABLE CRANES

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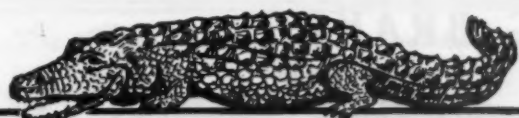
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THROATLESS SHEARS
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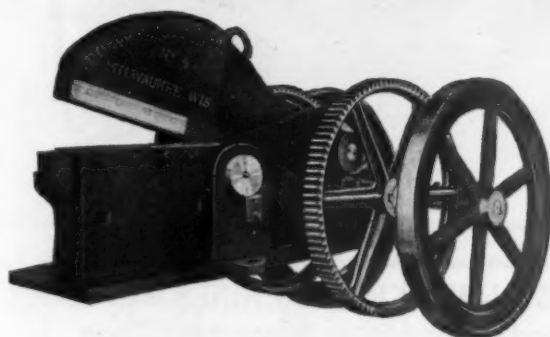
All types of Circle-Shear Blades

MARSHALLTOWN MANUFACTURING CO.
MARSHALLTOWN, IOWA





MILWAUKEE ALLIGATOR SHEARS



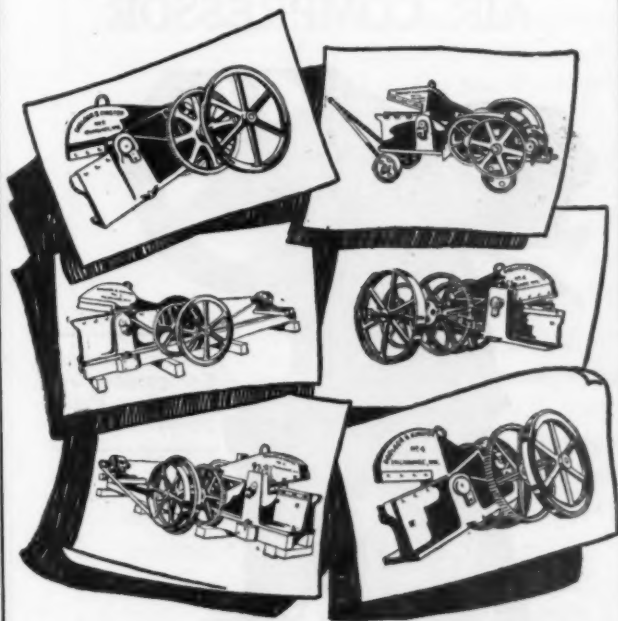
They Cut Without a Kick

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for shearing 1½" plates. Made in all standard sizes.

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COMPANY**
Cambridge City
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905

SHEET METAL WORKING MACHINERY



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Punching Presses

Are adapted for blank-cutting, perforating, punching, bending and forming operations on hardware, locks, sewing machines and other articles made of sheet metal. Special feeds, tie rods, safety clutches, etc., furnished to order.

They are "Built Right"

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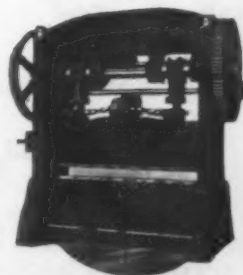
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TIE ROD PRESS-BRAKES



A combination of the better features of all existing types. Practically accident proof. Deflection minimum.

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Bend and Form Your Sheets and Plates on
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Made from 3 to 26 feet long to bend from light
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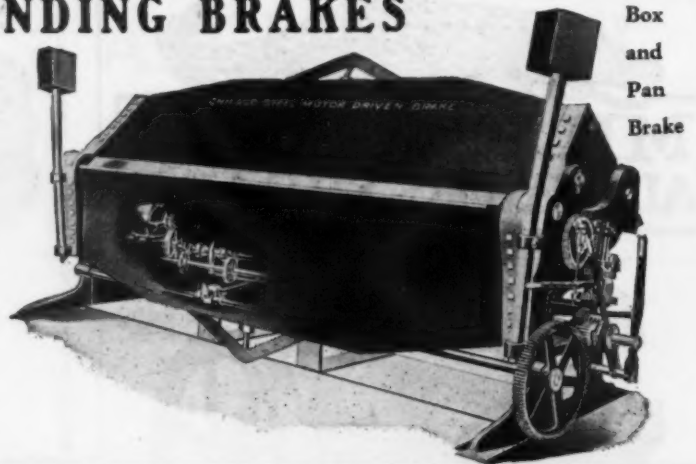
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The Guard
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the Bolster
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stroke of the
Punch. This
means that
both hands of
the operator
are protected—

That's Safety

The Guard
returns beyond
the center of
the Ram, on
half of the upward stroke. This allows the
operator to feed fast—

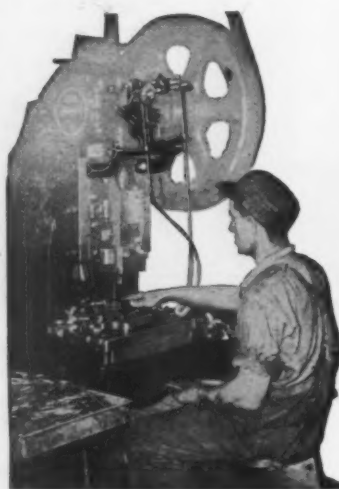
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No adjustments when changing dies.

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Work Ejecting
Compressor At-
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It blows the work into chutes or tote boxes and cleans dirt
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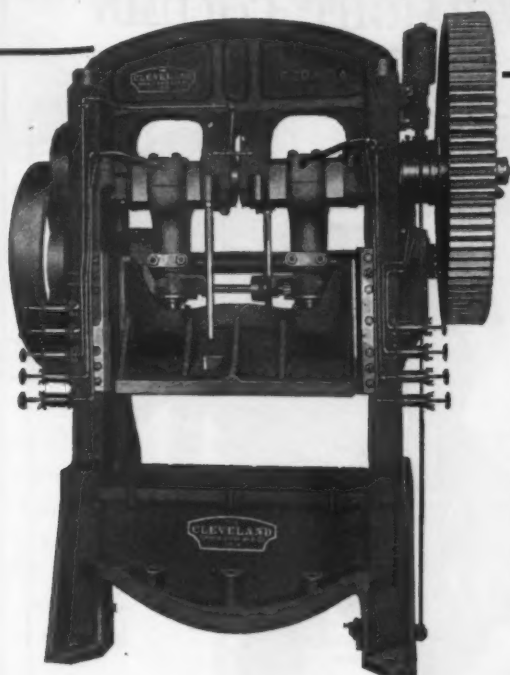
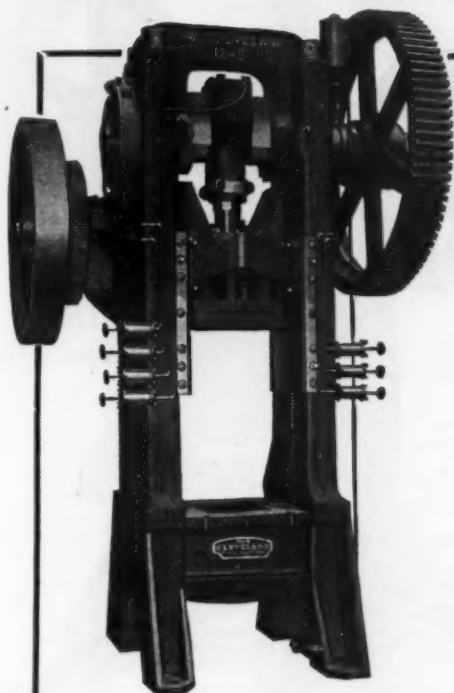
Send for catalog R-18 which also describes our general line
of air operated labor-saving devices.

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Logansport, Indiana



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From POWDER CANS To AUTOMOBILES

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From the Smallest Open Back Inclined to the Largest Single and Double Crank



NEW YORK
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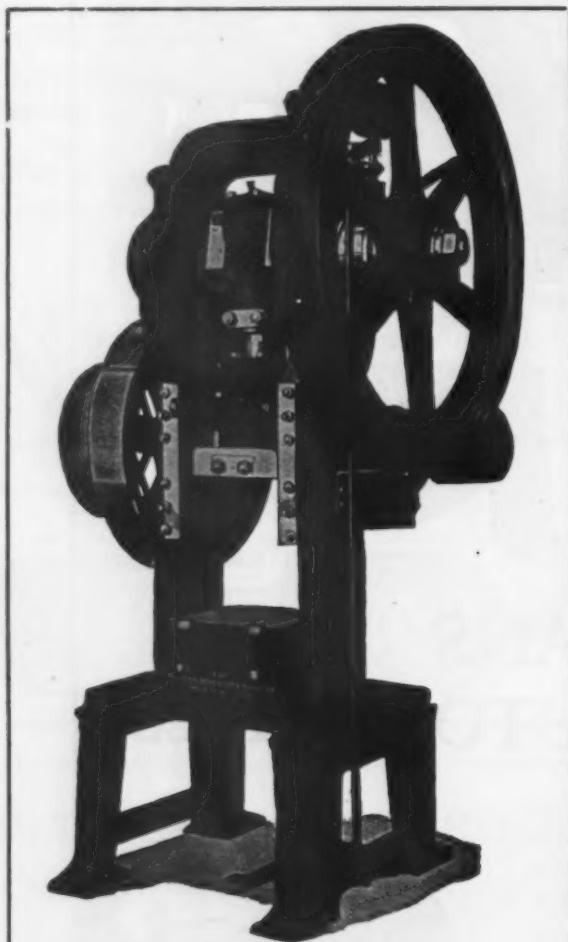
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The "Toledo" Straight Column Press,
No. 54, geared with solid frame

The "Toledo" Straight Column Presses are largely used for working the heavier gauges of metal, such as for operating embossing, cutting and drawing dies, and reducing dies; for punching, piercing, shaping and stamping heavy blanks, used in the manufacture of automobiles, steel cars, hardware, sewing machines, typewriters, bicycle parts, cash registers, electrical instruments, cutlery, skates, silverware, and similar work, as well as for stamping and embossing brass and aluminum baggage checks, coins, metals and builders' hardware; also for trimming drop forgings, either hot or cold.

These Presses are also particularly suited for heavy forming operations on stamped steel heads or ends for range boilers, brake drums, hub flanges and other automobile parts, and for cutting and forming pipe coupling rings or joints, as well as for a general line of deep drawing, reducing and forming operations.

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Forging and gear cutting a specialty.

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INCLINABLE
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A new and improved BLANK HOLDER

is now an exclusive feature of our

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It holds the blank positively and evenly during the entire work stroke.

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We Also Make a Complete Line of
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PRESSES
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SPECIAL MACHINERY

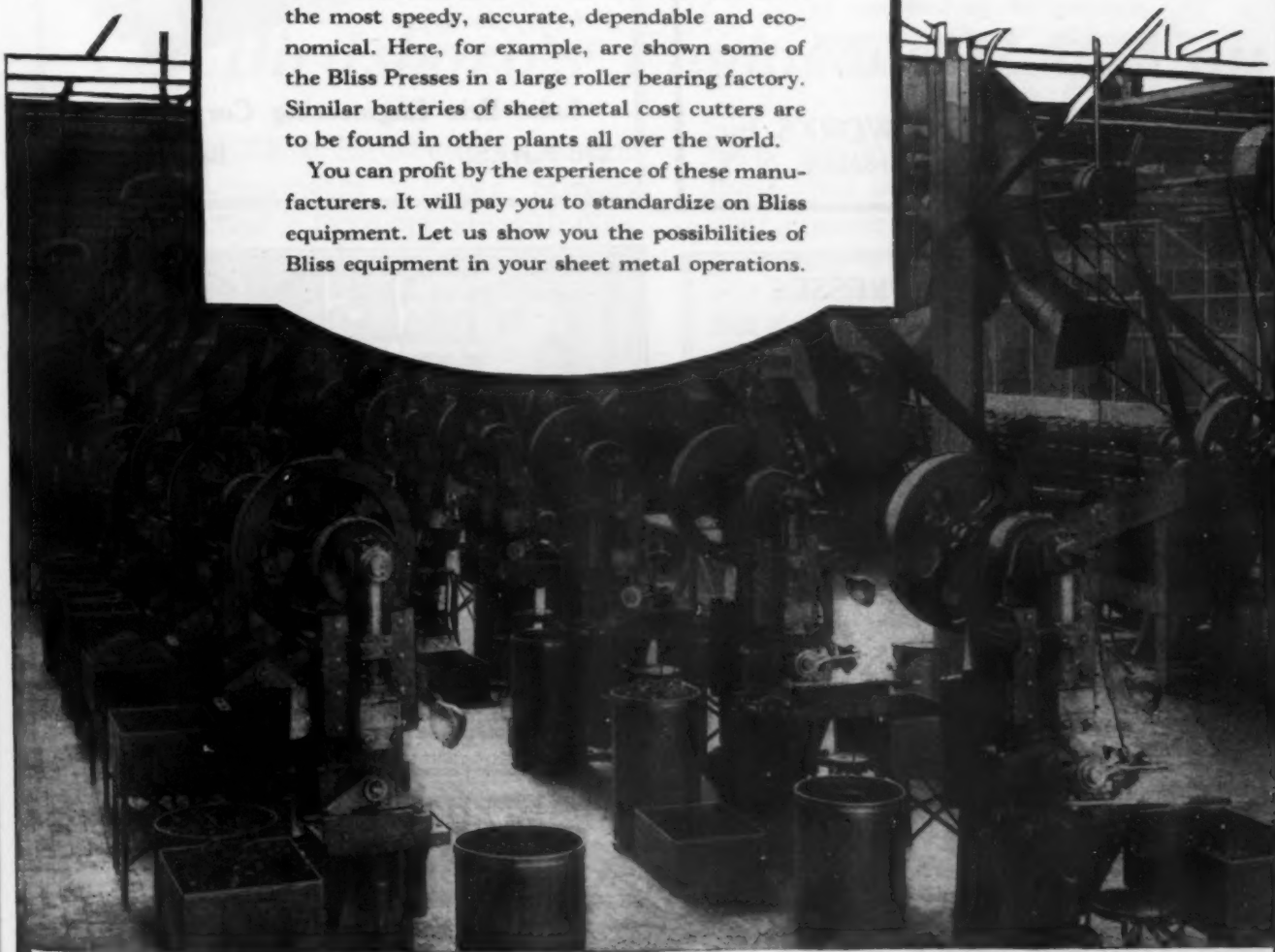
A Bliss Battery of Cost Cutters

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"Bliss" on your machinery
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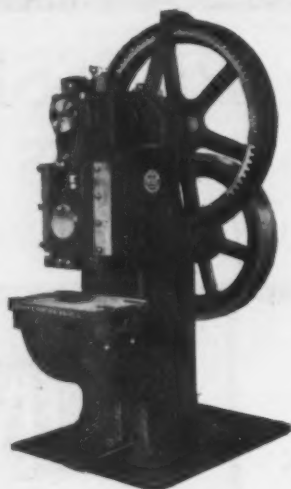
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Sturdy tie-rod construction assures long life for press and tools, with expedition and accuracy of performance in punching, bending, forming and perforating operations.

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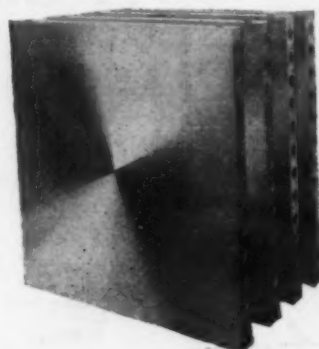
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The photograph below shows a sample of our work—a set of steel platens made either smooth planed or polished.

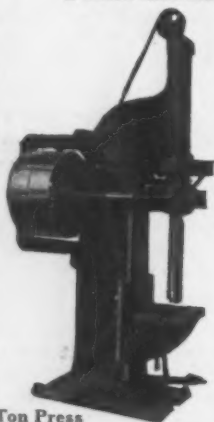
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Without Gauges

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3, 8, 20 ton sizes.

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Automatic Attachments

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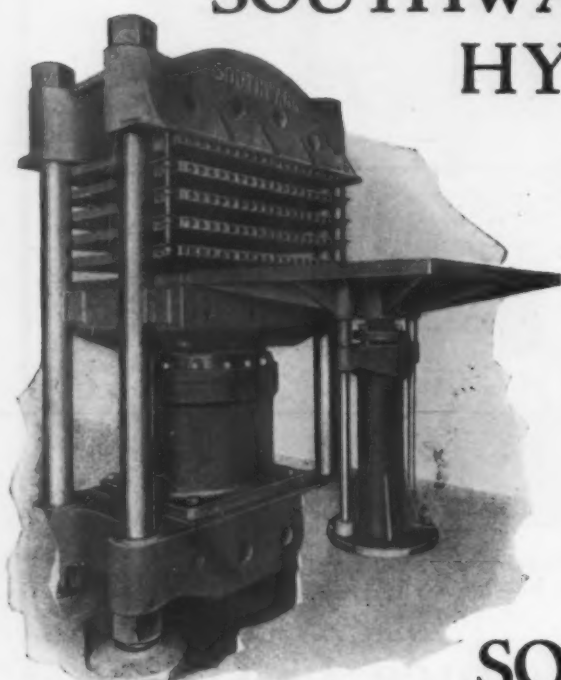
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of hydraulic presses and equipment for boiler, structural and railroad shops, shipyards, rubber mills, linoleum plants, asbestos mills and other industries requiring hydraulic equipment. Hydraulic Operating Valves. Special Machinery. Rolling Mills. Rolling Mill Machinery. Steel and Iron Castings. Rolls: "Durite", Steel, Chilled and Sand. Railroad Castings. Bolsters. Side Frames. Forging Ingots. Crushing and Concentrating Machinery. Jackson Belt Lacers.

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600-Ton 5-Opening
Steam Platen Press
with Elevator

ARE MADE IN DESIGNS
To suit every class of work

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150 Ton Horizontal
Hydraulic Forcing Press

Hydraulic Presses

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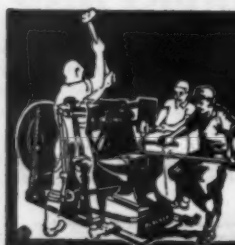
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Little Giant Wood Lathes for Pattern Making.
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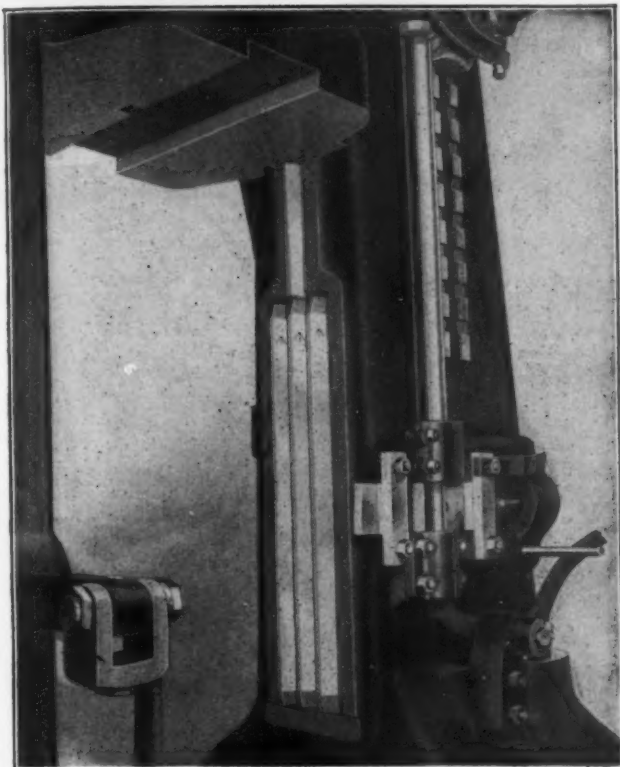
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Special Machinery

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Write for our Folder on Modern Blacksmithing
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Forge Shop Equipment
Sheet Galvanizing Machinery

ERIE, PENNA., U. S. A.

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Drop Lifters "PECK" Drop Hammers

"Peck" Automatic Lifters and "Peck" Drop Hammers make a combination that provides the greatest efficiency at low operating cost. We can't tell you their good points in this space, let us send you the complete particulars.

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1926

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MASS., U. S. A.

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Rolling Mill Equipment

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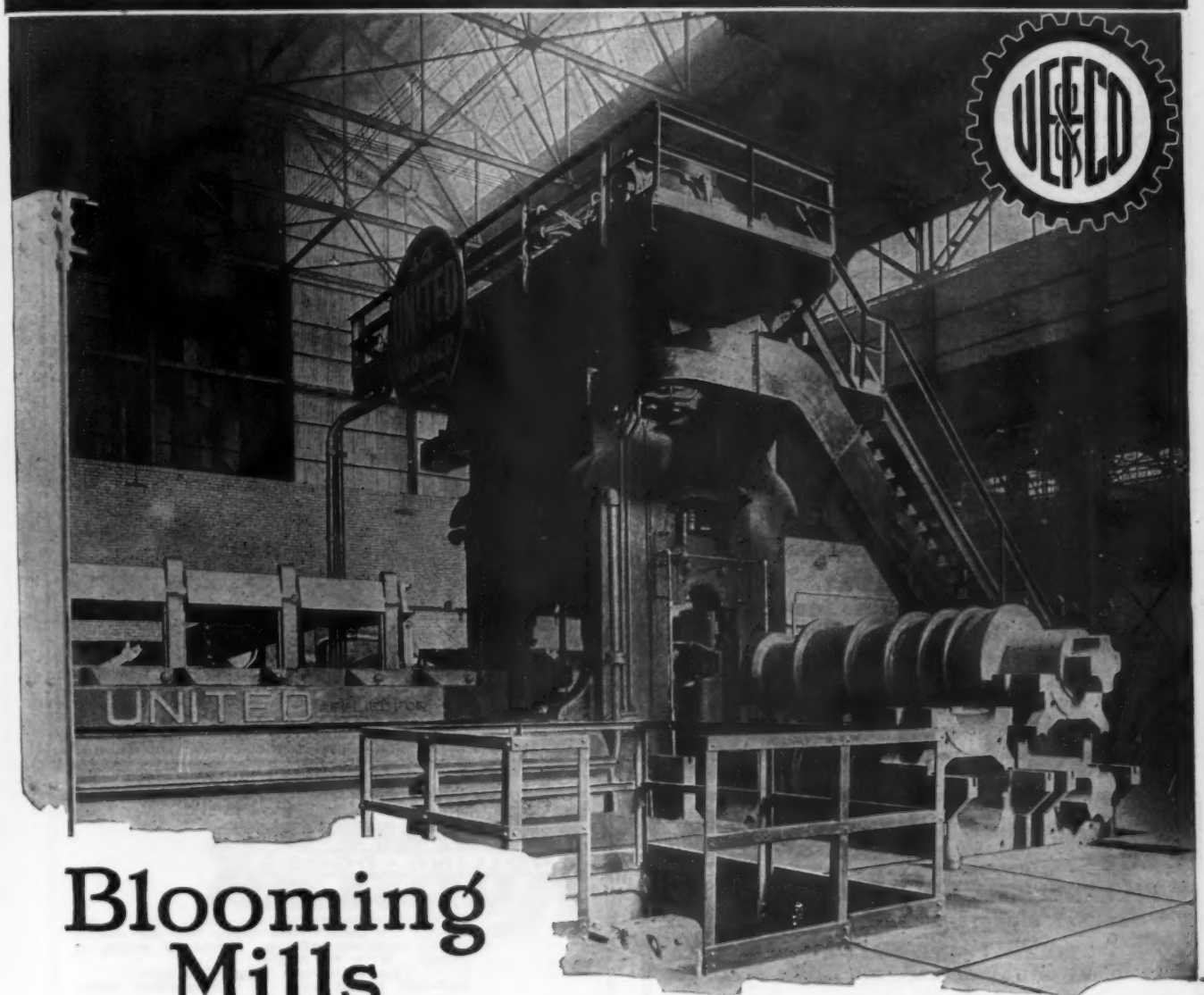
STEEL AND IRON CASTINGS
ROLLING MILL MACHINERY
SPECIAL MACHINERY

Blooming Mills
Structural
Mills
Tables
Straighteners
Crop Conveyors
Roll Lathes

WHEELING MOLD & FOUNDRY CO.

WHEELING, W. VA.

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Blooming Mills

44" 2-HIGH REVERSING BLOOMING MILL
Patented and Patents Applied For

This is a recent installation of United equipment. It embodies the latest improvements in blooming mill practice to insure continuous uninterrupted operation. To reduce roll changing time to a minimum the rig shown was provided, which removes both top and bottom rolls and fillings from the housings at one time, then moves them sideways and a new set of rolls and fillings put in place to be moved into the housings. Operators will appreciate this feature.

In order to be sure of the largest production and lowest operating cost per ton, secure the advantage of our wide and valuable experience by insisting on United equipment for your installations.

UNITED ENGINEERING & FOUNDRY CO.
PITTSBURGH — PENNSYLVANIA

Builders of Complete Machinery Equipment for Iron, Steel & Tube Works

WILLIAMS, WHITE & Co.

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ANGLE BENDING ROLLS	FORGING ROLLS
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DROP HAMMERS	PUNCHES & SHEARS
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SPECIAL MACHINERY

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ACID OPEN HEARTH
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Seamless Tube Mills • Lap and Butt Welded Pipe
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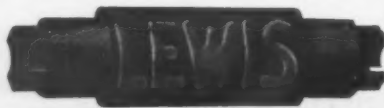
CARBON AND AIR FURNACE IRON SAND AND
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PHILADELPHIA ROLL & MACHINE CO.

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SUBSIDIARY OF TAYLOR-WHARTON IRON & STEEL CO.



Rolling Mill
Equipment
Chill Rolls
Roll Lathes
Gears and Gear
Reduction Units.

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Rolls Sand IRON CASTINGS
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Our equipment is first class and our organization composed of practical men. We would like to submit prices on any work in our line, either large or small. Correspondence invited.

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ROLLING • DOORS

Afford protection against fire, theft, and the elements. The perfect steel rolling door and shutter for all industrial buildings. Illustrated catalog on request. Write for details.

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Has Automatic Glass Rinser—Olive Green or White Finish. Connects to Water Supply. Copper construction.

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The American Chip Crusher will reduce yours so economically, and bring about such savings in oil, labor, space and shipping costs, that it will pay for itself in a few months. Write us for full particulars.

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CRUSHER AND MACHINERY CORP.

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Crushed chips are worth more than uncrushed, and they simplify your scrap handling problems. Economical crushing demands an American Steel-Turnings Crusher.

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Soldering

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An improved cartridge type heating unit enclosed in a heavy nickel silver case.

This casing threaded into a massive tip of high quality copper—thus insuring intimate thermal contact.

A non-conductive coil which disseminates any heat threatening to reach the handle.

A sturdy wooden handle perfectly fitting the hand.

Bolts, screws, and nuts—so easy to lose and so hard to replace—are entirely absent.

These are some of the improvements in the new G-E Soldering Irons which give to them a simplicity, efficiency, and economy of operation that is unexcelled by anything on the market.

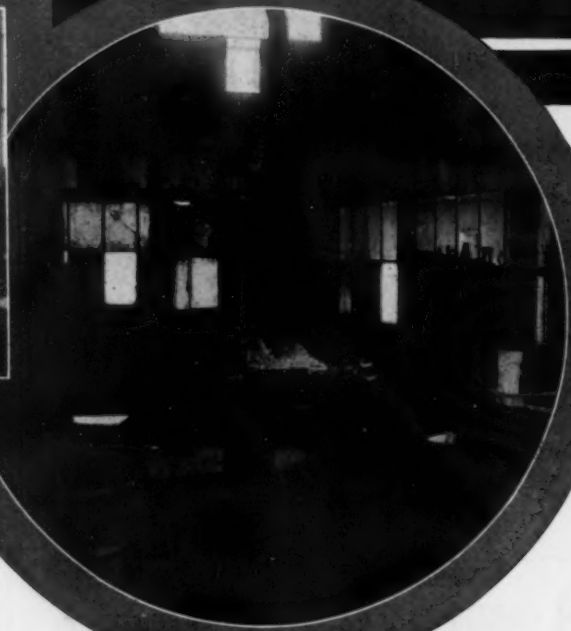
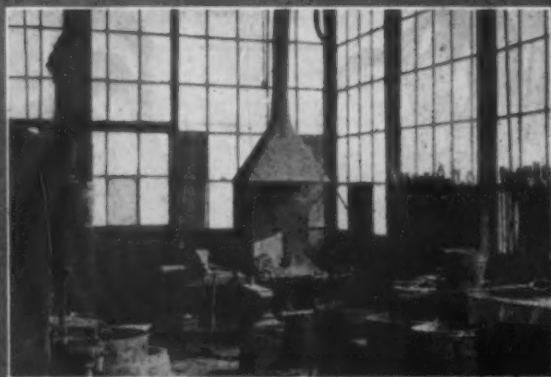
Although electric heat will not supplant all other forms of heat for industrial purposes, there are processes in every industry where it is the ideal heat—the most economical heat—the heat that ultimately will be used.



ULTIMATELY
ELECTRIC HEAT
IN EVERY INDUSTRY

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL PRINCIPAL CITIES



\$7³¹ Spent for
"Skybryte"
Saved \$46⁸⁰ in Electric Light Current!
and gave 7 times more light!

Is spending \$7.31 to save \$46.80
good economy?—and getting 7
times more light in the bargain?

IT is far more economical to clean glass with SKYBRYTE than to pay high bills for artificial illumination. A single gallon of SKYBRYTE cleans 800 sq. ft. of dirty glass. An unskilled laborer cleans 5000 or more sq. ft. per day. The average total cost including labor and material is less than $\frac{3}{4}$ c per sq. ft.

The Facts Speak for Themselves

Take the actual experience of The Ferro Machine & Foundry Co., Cleveland. Look at the pictures of their Blacksmith Shop above—and the amazing transformation in light made by the use of SKYBRYTE. The President writes us as follows:

"—with two gallons of "SKYBRYTE" three workmen completed the cleaning in one hour at a total cost, including labor and material, of \$7.31, or about \$.005 per square foot."

Cleans Quickly

An unskilled laborer coats SKYBRYTE on the dirty glass. At once the rust, soot and carbon scale are dissolved. It is then flushed off with water. The glass is perfectly clean. SKYBRYTE is absolutely harmless to paint, putty or sash.

Try it, at our risk. The coupon below makes it easy.

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Industrial Lighting Committee
National Electric Light Assn., New York

Skybryte
CLEANER (LIQUID)
Lets the daylight in

The SKYBRYTE Company
1198 Keith Building, Cleveland, Ohio

You may ship us five gallons of Skybryte on trial and one regular 75c Skybryte trial—enough to clean several hundred square feet. If we are not fully satisfied we will return the balance to you within 30 days return charges collect and you will cancel invoice. Otherwise we will pay your invoice for five gallons Skybryte at \$3.00 per gallon, F. O. B. Cleveland. Skybryte in bbls. \$2.50 per gallon freight allowed.

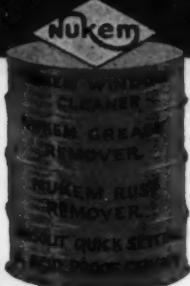
Company

Street

City

Try it at our risk

MORE CLEAN WINDOWS AND MORE PRODUCTION



Why build a daylight factory and then let dirty windows defeat your purpose? Clean them with Nukem Window Cleaner. It removes dirt and grease. It contains no acid. With it you can have clean windows at a cost of less than $\frac{1}{2}$ ¢ per square foot including labor. Let us send you a 2½ gallon trial order at \$3.00 per gallon, F.O.B. Buffalo, and if you're not satisfied we will cancel invoice.

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metal parts
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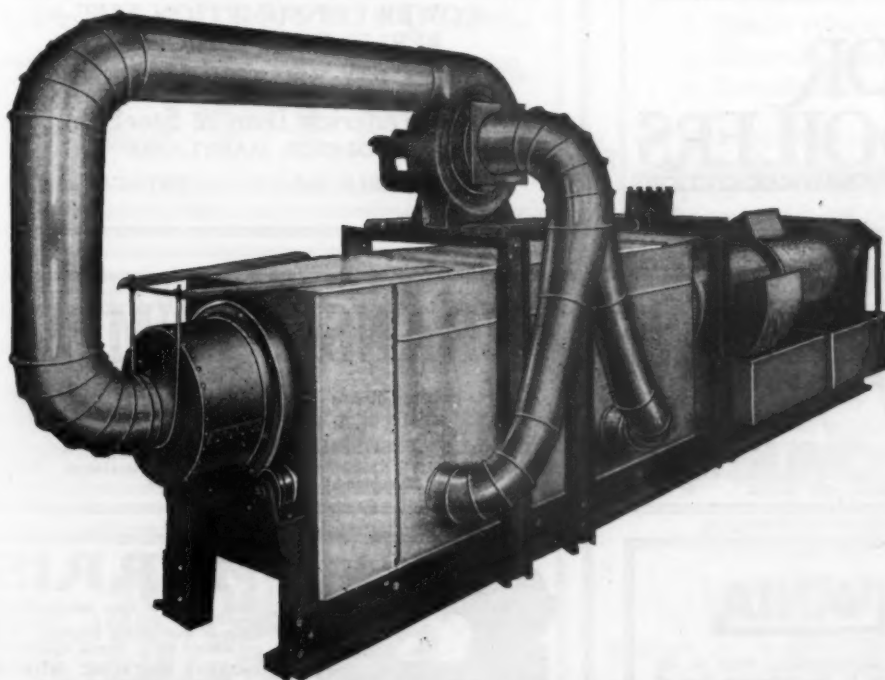
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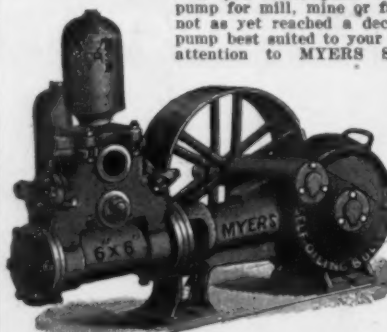
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ALLIS-CHALMERS**
MILWAUKEE, WIS. U. S. A.

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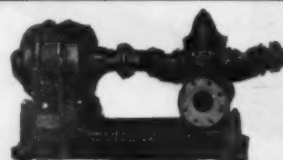
Reciprocating steam and power pumps for general service, boiler feeding, pipe line and oil country service.

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General Catalog 125 gives a concise, comprehensive view of all PENNSYLVANIA products. It should be in the reference files of every user of air compressors or centrifugal pumps. If you have not obtained your copy, send for it now.

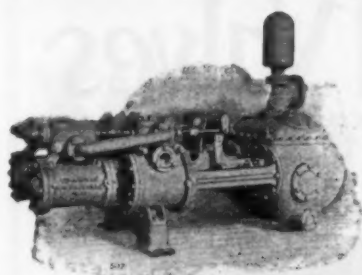
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For
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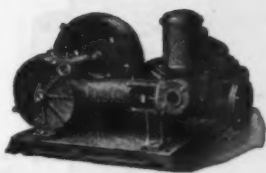
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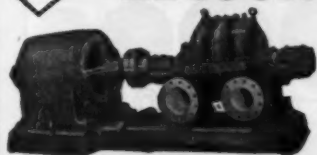
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Steam Turbines, for all speed and steam conditions; capacities up to 15,000 Hp. Catalog D42.
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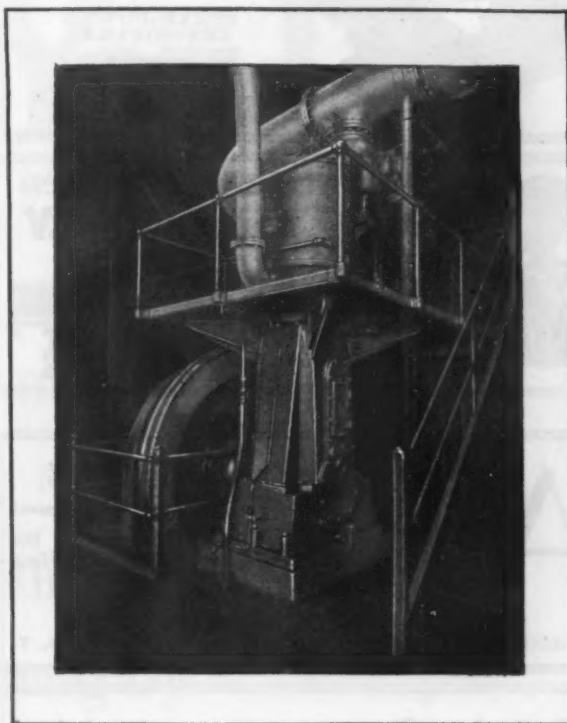
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SPECIAL WORTHINGTON R. D. V. PUMPS *developed for condensers in EDGAR STATION*

THE air and non-condensable vapors are removed from each of the two Worthington 50,000-square foot surface condensers in the Edgar [Weymouth] Station of The Edison Electric Illuminating Company of Boston by a special Worthington motor-driven Rotative Dry Vacuum Pump.

Among the special features of these pumps are

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The air cylinder is of the two-stage single-cylinder type. The valves are of the well known Worthington FEATHER Valve [Reg. U. S. Pat. Off.] type which contact perfectly with the seats without destructive impact.

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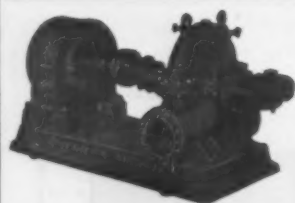
The special rotative dry vacuum pumps and the 1325-lb. per sq. in. boiler-feed pump supplied by Worthington, together with other equipment for this station, are examples of Worthington's continued resourcefulness and leadership in pioneer work for the power-plant industry.

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American Steam Pump Co.
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ONLY Steam Engines Good Engines ONLY

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Fig. 938

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ALL SIZES, ALL TYPES, ALL PRESSURES
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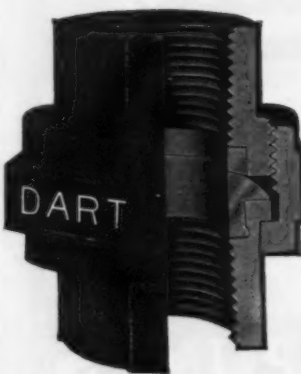
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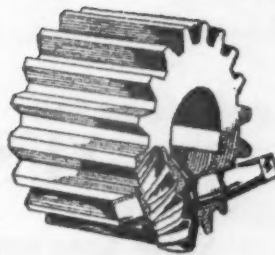
their contract work

constantly turn to these

pages for help.

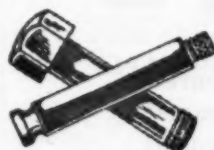
Your story goes home

at small cost.



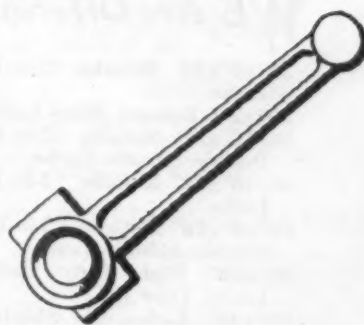
Gears

?



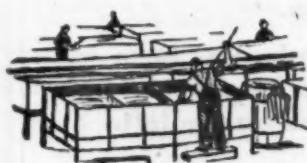
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Rates for other
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request.

THIS TIME IT'S A SILVER LINING

Some time ago the Blue Moon came out and a rare opportunity was shown forth in the used machinery field. The man who took advantage of this opportunity is probably waiting for another Blue Moon, but that's only once in a great while. However—

WE Are Offering:

38/60"x30' McCabe "2-in-1"
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Change Hexagon Turret
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4 Hds.
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10" New Haven Slotter
8" McCabe Bending Rolls
42" Throat Punch
50" Throat Punch

The Blue Moon has since been covered up by a dark cloud, but it left a silver lining. Here it is:

110" swing x 32' bed triple geared Bement Miles Lathe. Internal geared face plate, two steady rests, compound rest, crossfeed, five-step cone. Can be arranged for belted motor drive if desired. Excellent condition.

There's more Truth than Poetry in the above lathe. It's a real silver lining and can be bought for a rhyme. We're inclined to believe that this tool puts rings around the old Blue Moon when it comes to a real bargain.

We'd be more than glad to send additional information and quote the ridiculous price. All you have to do is ask for it, which entails not even the slightest obligation.

The fellow who can use this lathe was born under a lucky star! More good bargains are featured in the Offering Column on the left.

J. J. McCABE

Lathe and MACHINERY Corporation

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36"x17' Pond Triple Geared
30"x16' LeBlond H.D.—Q.C.G.
24"x12' American Q.C.G.
24"x 8' LeBlond Q.C.G.
21"x12' LeBlond Rapid Production
20"x10' Davis Q.C.G.

PLANERS

60"x60"x18' Pond 2-Heads
48"x48"x20' N.B. Pond 2-Heads
48"x48"x18' New Haven 1-Head
48"x48"x 8' Sellers 1-Head
36"x36"x21' Gray 2-Heads
32"x32"x 6' Gray 1-Head
30"x30"x20' Woodward & Powell 2-Heads
30"x30"x10' Cincinnati 1-Head
26"x34"x24' Whitcomb 2-Heads

SHAPERS

30" Norton
24" Steptoe
20" Smith & Mills
16" Stockbridge
16" Flather
14" Fitchburg

AIR COMPRESSORS

1750 Ft. L. D. & G. Belt Driven
800 Ft. Chgo. Pneu. Belt Driven
500 Ft. Laidlaw Belt Driven
464 Ft. Sullivan Belt Driven
350 Ft. Gardner Belt Driven
6x6 Curtis Duplex Ver. Belt Driven
1850 Ft. Sullivan Steam
1750 Ft. Chgo. Pneu. Steam
1050 Ft. Ingersoll Steam
600 Ft. Ingersoll Steam
425 Ft. Clayton Steam
60. Ft. N. Y. Air Brake Loco. Type

GENERATORS

200 K.W. Gen. Elec. 250 Volt. Compound
Wound Direct Current Generator 800 amp.,
200 R.P.M. complete with 1200 amp. switch-
board panel direct connected to 18x21 Erie
4-valve 300 H.P. Horiz. Steam Engine.
1560 K.V.A. Westinghouse Turbo Generator
1880 amp. 480-volt 3-ph. 60-cy. with 18 K.W.
D.C. Exciter Generator 125-volt 144-amp.
direct connected to Westinghouse Low Pres-
sure Steam Turbine 1800 R.P.M. with neces-
sary ftrs.
60 K.W. Triumph Elec. Co. 125 Volt D.C.
Generator 480 amp., speed 850 R.P.M.
50 K.W. Western Elec. Type OPE Alternating
Current Generator, direct connected to 11x12
Chandler & Taylor Horiz. Side Crank Engine
complete with Exciter, Switchboard Panel,
etc.

MILLERS

24"x24"x12' Ingersoll Horiz. Slab
No. 3 Brown & Sharpe Vertical
No. 2 Brown & Sharpe Universal
No. 5-C Becker Vertical
No. 5-B Becker Vertical
No. 22 Garvin Vertical
No. 7-H Becker Lincoln Type
No. 2½ Hendey Lincoln Type
No. 1½ Cincinnati Full Universal
No. 22 Garvin Vertical
Nos. 1 and 2 P. & W. Die Sinking
No. 54 Lees Bradner Auto. Thread
No. 2-A and No. 3 Milwaukee Plain

PUNCHES and SHEARS

48" Thr. Cleveland 1" cap.
42" Whiting 1" cap., arch. jaws
36" Thr. Clev. 1" cap. arch. jaws
27" Thr. Clev. 1" cap. arch. jaws
24" Thr. Morgan D.E. cap. 5/16x24"
20" Mack-Hemphill Hyd. Bloom Shear
18" Thr. Clev. ½" cap. arch. jaws
10" Thr. Cleveland Horiz. 1" cap.
No. 2 Carlin Allig. Shear cap. 5x5"
Chgo. Fdry. Allig. Shear 2½" cap
8" Canton Allig. Shear-Toggle Type

HAMMERS

6000 Lb. Chambersburg D.F. Steam
3000 Lb. Bliss Board Drop
2500 Lb. Bliss Board Drop
2500 Lb. Chambersburg D.F. Steam
600 and 800 Lb. Bement Steam S. F.
600 and 800 Lb. Union Board Drop
500 Lb. Beaudry Vert. Power
80 Pound Bradley Helve

PUNCH PRESSES

No. 55 D.G.C. Ferr. Db. Grd. 16" Str.
No. E57 Ferr. Db. Grd. 2½" Stroke
No. 75½ Bliss Straight Side 6" Str.
No. 6 Amer. Can. Co. Style-N. O.B.I.
No. 256 Toledo Db. Crank S.S. 4" Str.
No. 58 Toledo S.S. Trimming
No. 5 Crosby Stiles Type 2½" Str.

GRINDERS

20"x54" Diamond Wet Surface
16"x68" Landis Crankshaft
16"x66" Landis Universal
16"x36" Landis Universal
10"x48" Landis Universal
12"x36" Fitchburg Plain

RADIAL DRILLS

30" American T. A.
36" Gang.
6 Dreses
4 Dreses

SLOTTERS

10-inch Putnam
16-inch Betts
20-inch Niles

PRESSES

750-Ton Mesta Hydraulic Forging
1000-Ton Mesta Hydraulic Forging
1500-Ton Mesta Hydraulic Forging
365-Ton Camden Jogging Press

CRANES

Link-Belt Type K-2 Crawler Crane with 40 ft.
steel boom, 10 ft. inter. extension cables, 10
K.W. gener. set, 6½x8 4-cyl. 80 H.P. Wau-
kesha gaso. engine
5-Ton Whiting 35 ft. span, D. C. Elec.
10-Ton Morgan 73 ft. span, D. C. Elec.
10-Ton S. & M. 65 ft. span, D. C. Elec.
10-Ton Indus. 35 ft. Boom Std. Ga. Loco.
15-Ton Indus. 38 ft. Boom Std. Ga. Loco.
15-Ton Amer. 45 ft. Boom Std. Gauge. Loco.

STEAM SHOVELS

95-Ton Bucyrus Railroad Type
70-Ton Bucyrus Railroad Type

LOCOMOTIVES

1—36" H. K. Porter Co. Saddle Tank Air
equipped 4-wheel switching engine
1—Baldwin standard gauge 6-wheel switcher
63-ton
1—63-ton American Mogul Type standard
gauge sloping tank switching engine
1—Baldwin Locomotive Works standard gauge
4-wheel switcher saddle tank switching
engine
1—American Locomotive Works 4-wheel
switcher saddle tank standard gauge switch-
ing engine

TURRET LATHES

No. 2 Wood Tilted, 1" cap.
No. 3 Wood Tilted, 1½" cap.
No. 4 Wood Tilted, 1½" cap.
21" Gisholt, 2" cap.

ENGINES

20"x42" Ohio R. H. Corliss
25"x30" Erie 4-Valve Automatic
14"x20" Russell 4-Valve Automatic
12"x24" Buckeye Automatic

BOILERS and STACKS

250 H.P. Std. Water Tube 200 Lbs. Pres.
150 H.P. Horiz. Ret. Tub'l 100 Lb. Pres.
100 H.P. Horiz. Ret. Tub'l 100 Lb. Pres.
100 H.P. Erie Economic Firebox 100 lbs.
50 H.P. Hor. Firebox 100 lbs. pressure
84"-60"-48"-42"-36"-20"-18" Smoke Stacks

TANKS

26,000 Gallon Horizontal Steel Storage
22,000 Gallon Horizontal Steel Storage
19,000 Gallon Horizontal Steel Storage
15,000 Gallon Horizontal Steel Storage
11,500 Gallon Horizontal Steel Storage
7,700 Gallon Horizontal Steel Storage
7,000 Gal. Closed Rectangular Steel
3,000 Gal. Closed Rectangular Steel
317,000 Gal. Amer. Bridge Steel Water Tank

MISCELLANEOUS

2½" Newton Horiz. Boring Mill
Sull. Dia. Pros. Core Drill 2" core, 400" cap.
No. 4-B Wms. & White Bulldozer
1½" Ajax Forging Machine
Std. Engineering Beam Notcher 16" Str.
2" Curtis Pipe Threading Machine
6" Big. & Keeler Pipe Threading Mch.
7x8 Deane Triplex Power Pump
Allen 66" Pn. Yoke Riveter 13½" gap cap.
1" riv.
Lovekin Pipe Expanding and Flanging Ma-
chine, cap. 2" to 6" iron pipe, 2" to 8"
copper pipe
Dble. Hd. Plate Milling and Scarfing Ma-
chine, capacity up to 1" plate
No. 6 Amer. Sirocco Fans 34,000 cu. ft. cap.
200 H.P. Gen. El. 440-V., 3-P, 60 Cy. A.C.
Motor ap. 600
100-Ton Caldwell Hydraulic Wheel Press
400 Amp. Lincoln Arc Welder, D.C.
Foote Burt 4-spindle Heavy Duty Drilling
Boring and Reaming Machine
Baush 8-Spindle Multiple Drill

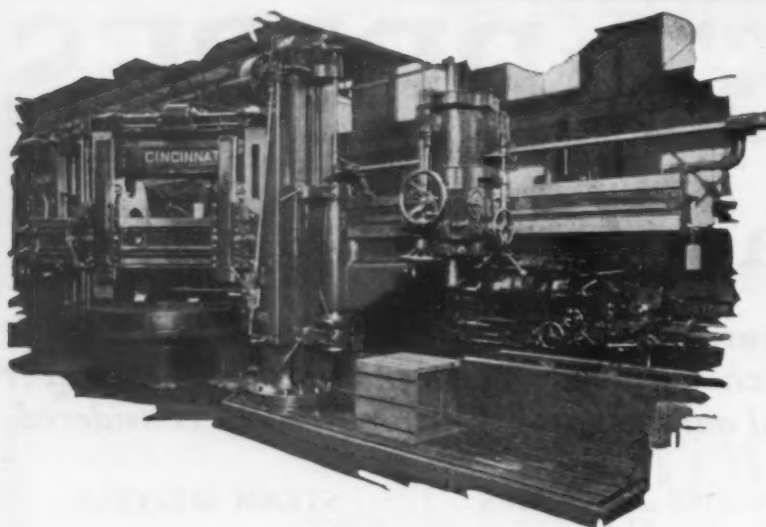
Complete
List

Complete descriptions of above items and everything else we
handle in the machinery line, such as Wood Working Ma-
chinery, Saw Mill Machinery, etc., fully given in our latest
Industrial Bulletin No. 209, which is mailed free on request.

Complete
Details!

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35th and Iron Streets
CHICAGO, ILLINOIS



Buy Now!

If you contemplate adding or replacing some machines at any time soon, buy now. Now is the time to land some great values. Look at the machines in the photograph just taken in our plant. Think of being able to buy such equipment at savings of from 25 to 60 per cent off current manufacturers' prices. And every tool bears our famous guarantee.

Our Guarantee:

Your money back if you return a machine within thirty days, freight prepaid. No excuses necessary.

ReMANUFACTURED
(ORIGINATED BY US)—
MACHINE TOOLS
Reg. U. S. Pat. Off.

IMMEDIATE DELIVERY

For more complete list see previous issue

VERTICAL BORING MILLS

- 6—72" Gisholt.
- 1—72" Cincinnati.
- 1—72" Colburn.
- 1—62" King.
- 1—60" Pittsburgh.
- 1—53" N. B. P.
- 1—52" Gisholt.
- 2—42" Colburn.
- 1—42" Gisholt.
- 1—30" Bullard.
- 1—24" Bullard Rapid Prod.

HORIZONTAL BORING MACHINES

Table Type

- 1—2-apdl. Espen-Lucas Boring, Milling and Drilling Machine.
- 1—No. 3 Beaman & Smith Engine Frame and Cylinder Borer.
- 1—Beaman & Smith Cylinder Boring and Milling Machine.
- 1—36"x42" Gisholt Gun Boring.
- 1—4" Bar Newark.
- 5—No. 1 Barrett.
- 7—Rockford.

Floor Type

- 1—5" Bar Detrick & Harvey.
- 1—3½" Bar Beaman & Smith.
- 1—4" Bar Giddings & Lewis.
- 1—3½" Bar Giddings & Lewis.
- 1—3½" Bar Landis.

LATHES

- 1—56"-64"x30' Johnson.
- 1—56"-64"x24' Johnson.
- 1—56"-64"x18' Johnson.
- 1—33"-51"x42' Le Blond.
- 1—33"-51"x20' Le Blond.
- 2—45"x24' Pond.
- 1—44"x16' Putnam.
- 4—40"x12' Fifield.
- 2—36"x42' Le Blond, Motor Drive.
- 3—36"x37' Niles, Bement, Pond, Motor Drive.
- 1—36"x30' Johnson.
- 4—36"x30' Pittsburgh, Geared Hd.
- 1—36"x24' Pittsburgh, Geared Hd.
- 1—36"x20' Pittsburgh, Geared Hd.
- 3—36"x14' Johnson, Triple Geared.
- 1—36"x12' Wickes.
- 1—32"x12' Wickes.
- 1—32"x12' Pittsburgh.
- 2—30"-34"x12' Lodge & Shipley, Selective Geared Head.

LATHES—Cont.

- 1—30"-34"x11' American Gd. Hd.
- 3—30"x11' Houston, Stanwood & Gamble.
- 2—27"-30"x14' Reed Prentice, Geared Head.
- 2—26"x18' Bridgeford.
- 4—26"x16' Canada.
- 5—26"x16' Niles, Bement, Pond.
- 2—26"x16' Whitcomb-Blaisdell.
- 5—26"x16' Bridgeford.
- 5—26"x14' Bridgeford.
- 5—26"x14' Niles, Bement, Pond.
- 2—26"x13' Wickes.
- 3—26"x12' Putnam.
- 5—26"x12' Bridgeford.
- 13—26"x11' Wickes.
- 30—26"x10' Niles, Bement, Pond.
- 21—26"x10' Canada.
- 15—26"x10' Whitcomb-Blaisdell.
- 3—26"x10' Walcott.
- 54—26"x10' Bridgeford.
- 61—26"x9' Bridgeford.
- 16—26"x8' Bridgeford.
- 15—25"x12' Le Blond.
- 5—25"x10' Le Blond.
- 20—25"x10' Sidney.
- 1—24"x15' Chard.
- 1—24"x12' Reed Prentice Gd. Hd.
- 9—24"x10' Cisco.
- 1—24"x10' American.
- 1—24"x10' Lodge and Shipley.
- 10—21"x10' Le Blond.
- 5—20"-22"x16' American.
- 5—20"-22"x12' American.
- 1—20"x10' Lodge & Shipley, Patent Head.
- 3—20"-22"x8' American, Motor Drive.
- 30—20"-22"x8' American.
- 5—20"x8' Le Blond.
- 6—19"x8' Le Blond.

PLANERS

- 1—72"x56"x36" Cincinnati, 2 Heads. (Side hds. can be added.)
- 1—42"x42"x22' Detrick & Harvey, dell, 2 Heads.
- 2—42"x42"x16' Rockford, 2 Heads.
- 1—42"x42"x9' Niles, Bement, Pond, 2 Heads.
- 3—36"x36"x18' Cincinnati, 2 Heads.
- 1—36"x36"x12' Woodward & Powell, 2 Heads.
- 2—36"x36"x10' Bickett, 3 Heads.
- 1—36"x30"x20' Whitcomb-Blaisdell, 2 Heads.
- 1—36"x30"x18' Whitcomb-Blaisdell, 2 Heads.
- 1—36"x32"x12' Gray, 1 Head.
- 1—30"x30"x14' Niles, Bement, Pond, 2 Heads.
- 1—30"x30"x10' Woodward & Powell, 3 Heads.
- 1—24"x24"x12' Whitcomb.
- 1—24"x24"x6' Rockford.
- 1—24"x24"x6' Hamilton.
- 1—24"x24"x6' American.

GEAR CUTTERS AND HOBBERS

- 3—No. 36 SM Gould & Eberhardt.
- 2—24"x12' Gould & Eberhardt.
- 3—No. 18-H Gould & Eberhardt.
- 1—No. 62 Fellows.
- 14—No. 6 Fellows.
- 1—No. 5 Lees-Bradner.
- 1—No. 1 Schuchardt & Schutte.
- 4—No. 1 Farwell.

PRESSES

- 1—96-G Toledo Double Crank.
- 2—No. DGG-56 Ferracute, Gd.
- 5—No. 58 Toledo Nosing.
- 1—No. 57 Toledo Nosing.
- 1—No. 69 Stoll.

MILLING MACHINES, GRINDERS, DRILLS, PROFILERS

See Last Week's Issue

HAND SCREW MACHINES

- 2—No. 10 Foster.
- 1—No. 10 3" Bardons & Oliver.
- 1—No. 5½ 3" Bardons & Oliver.
- 3—No. 8 Warner & Swasey.
- 5—No. 6 2¼" Warner & Swasey.
- 1—No. 4½ 1¾" Bardons & Oliver.
- 4—No. 4 1½" Bardons & Oliver.
- 20—No. 3 1½" Foster.
- 6—No. 3 1¼" Bardons & Oliver.
- 15—No. 2 1½" Foster.
- 3—No. 2 1" Bardons & Oliver.
- 1—1"x15" Pratt & Whitney.
- 2—No. 2 ¾" Pratt & Whitney.

TURRET LATHES

- 2—26" Libby.
- 9—25"x10' Le Blond Univ.
- 26—24" Davis.
- 5—24" Steidle.
- 1—24" Gisholt.
- 2—21" Gisholt.
- 26—21"x10' Le Blond, Univ.
- 3—20"x8' American.
- 25—19"x8' Le Blond.
- 24—19"x8' Le Blond Univ.
- 1—18" Libby.
- 1—2-apdl. Jones & Lamson.
- 1—2½"x26" Pratt & Whitney.
- 1—15"x7' Bardons & Oliver.
- 2—14" Foster.
- 1—1½" Pratt & Whitney.

AUTOMATIC SCREW MACHINES

- 5—No. 6-A Potter & Johnston.
- 8—No. 5-A Potter & Johnston.
- 1—No. 56 2¼" National Acme.
- 1—2" Model A Cleveland.
- 3—No. 75 1½" National Acme.
- 1—1½" Model A Cleveland.
- 1—7/8"-1¼" Cleveland.
- 4—5/8"-7/8" Cleveland.

Write for complete "Green List"

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An experience of 29 years in the Used Machinery business is YOUR GUARANTEE of RELIABILITY

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Machinery Corporation

SAYS SO—

NO MATTER WHICH!

Select any of these Tools and you will be suited for their mechanical condition and price.

Their quick-selling prices are strongly evidenced by the rapid sales of the Machinery in these two plants at Milwaukee—

P. F. Sheeran, at Pfister Hotel, Milwaukee, Wis., Supervising Sales.

See last week's Iron Age for list of Planers, Lathes, Boring Mills, Vertical and Horizontal Milling Machines, Drills, Radial and Multiple, Slotters, Plate and Boiler Shop Tools, etc.

TURRET LATHES AND AUTOMATICS

- 14" Gisholt, 1 1/4" hole (3)
- 21" Gisholt, 2" hole
- 22" Gisholt, 2" hole (3)
- 24" Gisholt (4)
- 24" Gisholt, with two motors, No. 803 and No. 804
- 24" Gisholt (2)
- 34" Gisholt (2)
- 2 x 24 Jones & Lamson (5)
- 3 x 36 Jones & Lamson (2)
- 2 x 24 Pratt & Whitney
- 2 x 24 Pratt & Whitney
- No. 2 Warner & Swasey, 16" swing, 1" hole
- No. 4 Warner & Swasey
- 24" Steinel, motor drive
- 24" Milwaukee, Pond, Rigid type
- 28" Milwaukee, Pond, Rigid type
- 20" x 7' 6" Bridgeport
- 36" Bridgeport
- 36" Bridgeport
- 16" x 5' Lodge & Davis
- 14" x 5' Fox Monitor
- 2" Jones & Lamson screw machine
- 5 1/2" x 10" Potter & Johnston
- No. 2 Potter & Johnston Semi-auto. arr. for motor
- 5A Potter & Johnston (2)
- 6A Potter & Johnston (2)
- 7A Potter & Johnston (3)
- Cleveland 2" automatic
- Cleveland 2 1/2" automatic
- Cleveland 2 3/4" automatic
- Cleveland 3" automatic
- Cleveland 3 1/4" automatic
- Acme No. 52, 3/4" capacity, four spindle
- New Britain (Prentice) No. 24 auto.
- New Britain No. 34 auto. multi-spindle

PISTON RING MACHINES
Gridley Automatic
Potter & Johnston Semi auto.
Potter & Johnston Semi auto.

GRINDERS

Cutter Grinders

Leland

Norton No. 1

Water Tool Grinders

- Wheel 18 x 3
- Diamond No. 5, takes wheel 36 x 4
- Barnes, 24"
- Wheel 20 x 1 1/2
- Barnes, motor drive

Plain and Universal Grinders

- Landis, 20 x 96 Norton, 10 x 36
- Landis, 16 x 72 Landis, 16 x 60
- Norton, 10 x 36 Landis, 12 x 36
- Norton, 14 x 72 Landis, 12 x 36

Double End Grinders
2 wheels, 6 x 1, with column
2 wheels, 8 x 1, with column
No. 7 Ramson, 24 x 2 1/2 wheel, countershaft
No. 7 Ramson, 24 x 2 1/2 wheel, countershaft
2 wheels, 6 x 1, motor drive
Cincinnati Norton, 2 wheels 20 x 2
Ramson, 24 x 2 1/2 wheel

Single End Grinders

Items Nos. 819, 110, 40 and 821

Barnes, single wheel

Drill Grinders

Grand Rapids, C3T

Sellers

Yankee

Pratt & Whitney

Grinders for Planer, Lathe and Boring Mill Tools

Gisholt (3)

Sellers

Cincinnati

Sellers

Miscellaneous Grinders

No. 5 Ramson

Grindstone, Cleveland Stone Co., 24" x 4"

Oliver Drill Pointer

Allis-Chalmers 7" Bench Grinder

No. 14 Gardner

No. 4 Gardner

Diamond Surface Grinder

Detroit Centerless Grinder

Ramson Buffing Machine, 14 x 2 1/2

Diamond Surface Grinder, 30" wheel, table 8' 4" x 24", motor drive

Pratt & Whitney, vertical

WHEEL LATHE

42" swing, Putnam, double head, belt dr.

KNEE TYPE HORIZONTAL BORING MILLS

4" Bar, Bement-Miles, Power raise to table

2 1/2" Bar, Niles

Pond, special

Newton Portable, floor type

UPRIGHT DRILLS

50" swing, Niles

42" swing, Barnes

36" swing, Aurora

30" swing, Gould & Eberhardt

28" swing, Barnes, Slab Head

26" swing, Bickford

HORIZONTAL DRILLS

No. 3, Pawling & Harnischfeger, motor drive, 2 1/2" spindle

2 round column, Pawling & Harnischfeger, belt drive

2 round column, Pawling & Harnischfeger, belt drive

2 round column, Pawling & Harnischfeger, belt drive

2 round column, Pawling & Harnischfeger, belt drive

No. 1 Barnes

SPECIAL DRILLS

Milwaukee Special Gas Engine Drill, for boring, facing, drilling and tapping Gas Engine bases

Dallett Portable, motor drive

ROTARY PLANERS

48" Niles

48" Niles

GEAR CUTTERS

42" Spur Gear Cutter, Gould & Eberhardt

17 x 13 Spur Gear Cutter, Wolcott

Spiral Gear Cutter, Reinecker No. 2

24 x 8 Gould & Eberhardt roughing

24" Gleason Bevel Gear Planer

WOODWORKING MACHINES

Mortising Machine, Fay & Egan

Post Drill

Fay Wood Boring Machine

Berlin Mica Sander

Coleville Saw Sharpener

Saw Setter, with vise

Oliver Cross Cut Saw No. 90

7" Swing Saw

Core Box Machine

Wooden Frame Saw Table, with motor No. 731

Spindle Disc Grinder, Fay & Egan

Pattern Makers Lathe, 18" x 10"

CENTERING MACHINES

Whiting centering machine, double spindle

No. 6 P. & W. centering machine

PRESSES

Metalwood 200 ton Press

Logeman Shaft Straightening Press

No. 35 Toledo

MISCELLANEOUS

Air Compressor, Imperial Type No. 10, 525 Cu. Ft. Capacity

15 Periodograph Registers, Gisholt

1 Periodograph Controlling Clock, Gisholt

Greaves-Klusman Winding Head

Thompson No. C-12 Welder

Schuster Straightening and Cutting

Off Machine for flat stock 1/4 x 1/4 x 8

Allis-Chalmers Plumbago Mixer

75" Class "A" No. 4 Schwartz

Brass Melting Furnace. Lined

air and oil pipe to Burners.

75" Class "A" No. 4 Schwartz

Brass Melting Furnace. Lined

air and oil pipe to Burners.

60" Class 3 Schwartz Brass Melting

Furnace

48" x 60" Tumbling Barrels, Whit-

ing Class A, spur-gear

KEYSEATERS AND SHAPERS

30" Stroke, Morton, portable

24" Stroke, Morton

24" Stroke, Morton

Pratt & Whitney, traveling head,

shaper, 14" stroke

PIPE MACHINE AND BOLT CUTTERS

3" Williams Pipe Machine

No. 6 National, 3" Bolt Cutter

3 1/2" Capacity, Curtis & Curtis,

hand power

1 1/2" Capacity, Acme Bolt Cutter,

double head

Pipe Bending Machine

SHEET METAL TOOLS

3" Dia. rolls, 10' long, hand oper-

ated

Giant Groover, 60", 4" bar

Bench Crimper

Hand Brake

Hard-to-get "Second-hand"

Nothing like these Big Machines have been available for sometime—nothing like them will.

Big Planers

Niles-Bement-Pond, 12-ft. wide, 12-ft. high, Table 30-ft. in length inside the pockets, with four (4) Heads—two on Crossrail, and one on each housing, complete with Motor-Drive, including Motors.

Bement-Miles & Co.'s, 10-ft. wide, 10-ft. high, Table 30-ft. in length inside the pockets, with four (4) Heads—two on Crossrail, and one on each housing, complete with Motor-Drive, including Motors.

Putnam Machine Co.'s, 6-ft. wide, 6-ft. high, Table 16-ft. in length inside pockets, with four (4) Heads—2 on Crossrail, and one on each housing, complete with Countershaft.

Big Upright Boring and Turning Mill

Niles-Bement-Pond, 144-in. Swing—with 12-ft. height also under Crossrail—Heavy, Double-web Housings, two (2) Heads on Crossrail, complete with Motor-Drive, including Motors.

The solidest and honestest argument we can offer you is the way we have sold out big plants all over the country.

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MACHINES AND TOOLS

FOR SHEET METAL WORK

MACHINE TOOLS

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NEW STEEL BARS

PIPE AND TUBING

At bankrupt sale and private sale. 3 large plants. The United States Headlight Mfg. Co., Buffalo, consisting of 500 machine tools, 200 sheet metal working machines and tinsmith tools, enormous lot of bench tools, vises, stake holders, forming tools, blow horn, stakes, double seaming stakes, hatchet stakes, Beakhorn stakes, tinner's hand snips, etc. Another bankrupt sale: All the machinery from a compressor plant and one large machine shop, consisting of 300 machine tools used only from 1 to 3 years. Photo and full description mailed on application. Money back guarantee on any machine tools. This list will appear every other week in IRON AGE. This is only a partial list.

LATHES

- 2—16" x 6' Hamilton, \$250.00 each, 90% new.
- 1—20" x 8' LeBlond heavy duty, quick change gear, \$500.00, 90% new.
- 1—18" x 8' American, quick change gear, \$500.00, 90% new.
- 1—20" x 26" x 10' Rahn-Larmon, quick change gear, lathe, \$600.00.
- 12—20" x 10' American Rad. Co. Heavy Duty Manufacturing Lathes, not screw cutting, \$550.00 each, 95% new.
- 7—20" x 8' New Heavy Duty Hindman-Duff Manufacturing lathes, not screw cutting, \$350.00 each, 95% new.
- 6—16" x 6' Blaisdell, \$250.00 each, 90% new.
- 1—24" x 10' Porter, \$500.00, 90% new.
- 1—28" x 8' Greaves-Klusman, \$500.00, 90% new.
- 2—36" x 14' Putnam Heavy Duty, \$750.00, 90% new.
- 1—36" x 8'6" low down bed spinning lathe with swivel compound rest, \$750.00, 90% new.
- 50—Engine Lathes from 16" to 36" swing, 8' bed to 21' bed, \$250.00 and upward including chucks.

MILLING MACHINES

- 1—Cincinnati No. 2 Universal Milling Machine, dividing head and vise 90% new, \$900.00.
- 2—Brown & Sharpe Plain Millers, dividing head and vise, \$350.00.
- 1—Garvin No. 13 Plain Miller, 90% new, \$350.00.
- 3—Garvin No. 2 Hand Milling Machines, 200.00.
- 1—Pratt & Whitney No. 13 Plain Miller, 90% new, \$135.00.
- 15—Hand Millers at 100.00 each.

DRILLING MACHINES

- 1—4'6" Dresser-Mueller Radial, gear box drive, plain, 90% new, \$750.00.
- 1—36" Rockford Heavy Duty, sliding head, 95% new, \$450.00.
- 1—30" Rockford Heavy Duty, sliding head, 95% new, \$350.00.
- 6—26" Cincinnati, sliding head, 90% new, \$200.00.
- 6—22" Barnes, sliding head, 90% new, \$150.00.
- 20—18" Snyder, Rockford, Buffalo Forge at \$100.00 each, 90% new.
- 15—Barnes Speed Drills at \$40.00 each, 90% new.
- 1—Barr & Co., 5 spindle Upright Sensitive Gang Drill, 90% new, \$350.00.

SHAPERS AND GEAR CUTTERS

- 2—16" stroke, Smith & Silk back geared shapers, cone drive, \$250.00.
- 2—20" stroke, Geo. Juengst back geared shapers, cone drive, 300.00.
- 1—20" stroke, Hendey back geared shaper, cone drive, \$350.00.
- 2—20" stroke, Walcott heavy duty, back geared crank shapers, cone drive, 90% new, \$600.00.
- 1—16" stroke, Gould & Eberhardt back geared crank shaper, cone drive, 90% new, \$750.00.
- 1—28" stroke, Gould & Eberhardt back geared crank shaper, cone drive, 90% new, 900.00.
- 1—24" Gould & Eberhardt automatic gear cutting machine, 90% new, \$450.00.

TURRET LATHES

- 2—No. 4' Bardou & Oliver, 450.00 each.
- 1—No. 4' Bardou & Oliver, \$400.00.
- 2—No. 2 Pratt & Whitney, \$250.00 each.
- 2—No. 2 Bardou & Oliver, \$250.00 each.
- 2—Cleveland Model A 2 1/2 Automatic Screw Machines, \$500.00 each.
- 5—No. 1 Pratt & Whitney at \$200.00 each.
- 1—No. 1 Wells Screw Machine, 150.00.
- 10—1/2" Garvin No. 1-O Screw Machines at \$90.00 each.
- 2—Lodge & Davis Fox Turret Lathes, \$350.00 each.

WOODWORKING MACHINES

- 3—Powell & Co. 16" Buzz Planers or Hand Jointers, \$175.00 each.
- 2—H. B. Smith Swing Cut-Off Saws at \$100.00 each.
- 6—26"-30"-36"-42" Band Saws from \$100.00 to \$350.00.
- 3—Powell & Co. Heavy Duty Iron Frame Rip Saws, iron beveling top, \$175.00.
- 2—Double Spindle Shapers, \$100.00 each.
- 1—2 Spindle Automatic Shaper, \$350.00.
- 3—Wood Frame Saw Tables at \$35.00 each.
- 5—Wood Turning Lathes at \$35.00 each.

SPECIAL BARGAINS

- 25—PRATT & WHITNEY 12" heavy type automatic milling machines with receding table, 3 Tee slots in table, 90% new. My price \$500.00, factory price \$1,200.000. Sold already 225 of these millers. Photo and specifications mailed on application.

SPECIFICATIONS

RANGE
Table working surface.....6"x18"
Table travel.....12"
Table center to end of spindle, maximum 8 1/2"
Table center to end of spindle, minimum 3"
Table top to center of spindle, minimum 1 1/2"
Head spindle to foot-stock spindle, maximum 17"

SPINDLE
Spindle diameter.....2 1/4"
Taper hole in spindle.....No. 11 Jarno
Spindle gear, pitch diameter.....12"
Spindle speeds, regular
44, 65, 92, 103, 146, 212 R.P.M.
Spindle speeds, special (to order only)
49, 51, 77, 123, 186, 242 R.P.M.

TABLE FEEDS (Independent of Spindle Speeds)
Inches per minute
.57, .83, 1.14, 1.75, 3.03, 4.55, 8.3, 9.2
Rapid traverse of table forward 288" per min.
Rapid traverse of table, return, 393" per min.

DRIVE
Driving pulley, diameter.....12"
Driving pulley, speed.....350 R.P.M.
Belt width.....3"

SPEED GEARS, 22 and 48 teeth
28 and 42 teeth
34 and 38 teeth

FEED GEARS, 30 and 120 teeth
40 and 100 teeth
50 and 100 teeth
65 and 85 teeth

FLOOR SPACE.....54"x54"

WEIGHT
Net weight.....3750 lbs.
Gross weight, boxed for export.....4550 lbs.
Cubic feet of box.....130

- 75—PRATT & WHITNEY No. 12 2-spindle vertical profiling machines with countershaft, oil pump piping, 90% new. Weight 4000 lbs. Price \$200.00, Factory price \$1,100.

SPECIFICATIONS

The table, which has a working surface 12 x 15 inches (305x381 millimeters) has a cross traverse of 2 1/2 inches (50.7 millimeters). The heads have a longitudinal traverse of 25 1/2 inches (650 millimeters) and a vertical adjustment of 3 1/2 inches (95 millimeters). Distance between uprights is 19 inches (483 millimeters).

These machines are specially adapted for accurate and interchangeable work. A roughing and a finishing milling cut may be taken at one setting of the piece, with this machine. The spindles are belt driven and may be driven at very high speed without excessive driving-shaft speeds. Ball thrust bearings are provided at each end of both gear and pinion, thus permitting the spindle to be run equally well in both directions.

The gearing for operating the table and head is constructed so as to permit the taking up of all back lash by means of double gears and double racks, one part of which may be adjusted in relation to the other part.

15—PLANERS

Gray Worcester planers, one head on cross rail 36" x 36" x 10'; 38" x 8'; 24" x 24" x 5' at \$350.00 each.

MISCELLANEOUS

- 1—No. 5 Toledo Geared power punch press, \$500.00.
- 25—Chain Hoists 1, 1 1/2, 2, 3, 4, and 10-ton capacity.
- 1—16" Putnam Slotter.
- 1—16" Niles Pulley Boring Mill.
- 2—Double Spindle Diamond Wet Grinders.
- 2000 New Steel Split Pulleys, all sizes.
- 75—Steam Pumps and Air Compressors.
- 6000 ft. 1 15/16" diameter and 2 7/16" diameter cold rolled Line Shafting with couplings to match.
- 1200 Hangers and Boxes.
- 2000 Slightly Used Milling Cutters, High Speed and Carbon.
- 3000 Slightly Used Twist Drills, High Speed and Carbon.
- 2000 Reamers, very cheap. Send your inquiries, have all sizes. State whether High Speed or Carbon.
- 10,000 lbs. High Speed Tool Steel Scrap, excellent quality. State best cash price for same.

MOTORS AND GENERATORS

- 100—3-phase, 25-cycle, 220-440-volt, Westinghouse, General Electric, Crocker-Wheeler Motors, from 5 H.P. to 50 H.P.
- 25—Transformers, 10-15-20-30-35 K.W.
- 25—Generators, from 5 K.W. to 250 K.W.
- 10—Motor Generator Sets for testing and charging batteries.

PIPE and TUBING

- 25,000 ft. 1" pipe
- 50,000 ft. 1 1/4" pipe
- 20,000 ft. 1 1/2" pipe
- 25,000 ft. 2" pipe
- 10,000 ft. 3 1/2" pipe
- 5,000 ft. 5" pipe
- 2,000 ft. 6" pipe
- 3,000 ft. 8" pipe
- 300 Ton New Mill seconds.

BOILER TUBES

- 60,000 ft. 3 1/4"
- 5,000 ft. 4"

HIGH SPEED and CARBON TOOL STEEL

- 300 tons in round and flats from 7/16" to 10e. per lb.
- 200 tons New Chrome Nickel Bars, 1 1/4" round and 2 1/4" round, Carbon, .35-.45; Nickel, 3.25-3.75; Chrome, 1.25-1.75. Price \$60.00 per ton.
- 200,000 lbs. 2 1/4" round cold rolled Steel Mill lengths, Price \$45.00 per ton.

LEATHER and RUBBER BELTING

- 20,000 ft. New Rubber Belting, up to 12" wide.
- 20,000 ft. Slightly Used Rubber Belting, from 6" to 30" wide.
- 100,000 ft. Good Usable Leather Belting, single and double ply, from 1" up to 12" wide.
- 2,000 ft. 30" wide 6-Ply Rubber Conveyor Belting, 1/2" rubber covering, highest grade belting made, very good condition at \$2.00 per ft. Factory price \$5.00 in any quantities.

Jacob Ullman, 48-82 Oneida St., Buffalo, N. Y.

SIMMONS

MACHINE TOOLS

New and Used

ATTRACTIVE PRICES

MONEY BACK GUARANTEE

TESTED BEFORE SHIPMENT

AUTOMATICS

- 10-2 1/2", 3 1/4", 4 1/4" Gridley Single Spindle, motor drive
- 4-3/4" Gridley, four spindles
- 2-3/4" Gridley, one spindle
- 1-3/4" Cleveland, single spindle
- 2-3/4" Cleveland, single spindle
- 1-3 1/4" Cleveland, single spindle
- 2-00 B. & S. Turret, Forming
- 4-0 B. & S. Automatics
- 1-0 B. & S. Out-off
- 1-1 1/2" x 7" New Britain

VERTICAL BORING MILLS

- 2-24" Bullard R.P., side head
- 1-30" Gisholt Vertical Turret
- 1-34" Bertram (Niles) Turret
- 1-36" Vertical turret and side
- 2-42" Bullard, two heads
- 1-54" Colburn, two heads
- 1-60" Cincinnati two swivel hds.
- 1-72" Niles, two swivel heads
- 1-84" Pond spec. x heavy, two swivel heads, gear feeds
- 1-84" Niles-Bement-Pond, 2 heads, gear box, motor drive

HORIZONTAL BORING MILLS

- 1-3" Bar No. 2 Lucas
- 1-3" Bar Rochester, S.P.D.
- 2-3" Bar Rockford, S.P.D.
- 1-4" Bar Detrick-Harvey floor type, motor drive
- 1-4" Bar Sellers floor type
- 1-4 1/2" Bar Niles
- 1-5" Bar Beaman-Smith No. 4
- 1-OB Bement Knee Type
- 1-Barnes, 7' table, 3" bar

RADIAL DRILLS

- 1-24" Mueller Gear Box
- 1-28" American High Speed
- 1-30" Henry-Wright High Speed
- 1-60" Niles Semi Universal
- 1-72" Bickford Full Universal
- 1-72" Niles Full Universal
- 1-72" Bickford Gear Box
- 1-72" American Gear Box
- 1-72" Cincinnati-Bickford, M.D.
- 1-84" Reed-Prentice Gear Box, 16 spindle speeds

MULTIPLE SPINDLE DRILLS

- 2-No. 14 Natco, 22 spindles
- 1-No. 37 Natco, 20 spindles
- 2-No. 41 Natco, 20 spindles
- 2-No. 3 Baush, 36 spindles
- 1-No. 30 Baush, 8 spindles
- 2-2-D Moline, 4 spindles
- 2-20" Rockford, 4 spindles
- 2-28" Barnes, 4 spindles
- 8-3-spindle Allen H. S.
- 4-2-spindle Allen H. S.

GRINDING MACHINES

- 1-No. 16 Blanchard, 26"
- 1-26" x 12" Landis Plain
- 1-14" x 96" Norton Plain
- 3-14" x 72" Norton Plain
- 1-14" x 50" Norton Plain
- 1-14" x 36" Norton Plain
- 1-10" x 36" Norton Plain
- 6-6" x 32" Norton Plain

- 1-No. 1 B. & S. Universal
- 2-4 x 30 B. & S. No. 11
- 1-5 x 18 Ott Plain
- 1-20 x 72 B. & S. No. 5 Univ.
- 2-No. 14 B. & S. Wide Wheel
- 1-No. 106 Rivett Internal
- 1-No. 2 Formed Cutter Grinder
- 1-No. 2 Walker Tool Room
- 1-Yankee Drill W. F. J.
- 1-8" Hisey Wolf Motor
- 1-No. 4 Gardner Ball Bearing
- 2-Gisholt Lathe Tool Grinders
- 1-4" x 30" P. & W. Cylindrical
- 1-P. & W. Deep Hole Drill
- 1-No. 6 Bryant Chucking
- 1-Washburn Drill Grinder
- 6-No. 1 Norton Tool Cutter
- 1-Blair Automatic Surface
- 1-14" P. & W. Surface

- 40" x 17" Fitchburg Cone Drive
- 36" x 60" Bridgeford Boring G. H.
- 36" x 14" Putnam Motor Drive
- 36" x 14" Putnam Cone Drive
- 34" x 22" Pond Cone Drive
- 32" x 25" Recom. Geared Head
- 30" x 14" Lodge & Shipley
- 3-30" x 11" American Geared Head, arranged motor drive
- 2-30" x 13" ditto
- 30" x 16" LeBlond Heavy Duty
- 26" x 16" Prentice Geared Head
- 25" x 12" LeBlond Heavy Duty
- 25" x 10" LeBlond Motor Drive
- 24" x 10" Blaisdell Cone
- 24" x 12" Greaves-Klusman
- 24" x 8" Reed Motor Drive
- 18" x 16" Cincinnati Cone, Q.C.G.
- 18" x 8" Lodge & Shipley

SPECIALS

- 1-No. 16 Blanchard Motor Driven Grinder
- 1-96" Long-Allstat Size C Multiple Punch
- 1-42" x 18" Geared Head N-B-P Lathe
- 16-18" Gleason Gear Generators
- 3-11" Gleason Gear Generators
- 6-6" Gleason Gear Generators
- 10-20" and 24" Cincinnati Rotary Tables
- 1-36" x 36" x 18" N-B-P Planer, 4-heads
- 1-36" x 36" x 10" N-B-P Planer, 4-heads
- 4-30" x 30" x 12" N-B-P Planer, Dbl. Deck—2-heads

MISCELLANEOUS

- 60" Doelcam Rotary Sand Blast
- XB-2 Ingersoll-Rand Compressor
- 2-B Gorton Out-off Machine
- 40-A Thompson Butt Welder
- Rennerfelt Electric Furnaces
- La Pointe Broaching Machines
- 8" Bignall Keeler Pipe
- Rockford Balancing and Drilling
- Hilles-Jones Guillotine Shear
- 5 x 5 Carlin Alligator Shear
- No. 0 Eastman Photostat
- 10,000 lb. Steam Forging Hammer
- 40 lb. Bradley Helve
- 1000 lb. McDougal Porter single leg forging
- 4-Nutter Barnes Out-off Saws
- 4" Oster Pipe Machine
- 4" Williams Pipe Machine
- No. 2 B. G. Garvin Tappers
- No. 2 Garvin Tapper
- No. 1 Garvin Tapper
- 6 x 6 Curtis Double Compressor
- 10 x 10 Curtis Double Comp.
- 4B Nasel Air Hammer, M.D.
- 25 ton Niles, D.C. Crane

LATHES

- 72" x 56" N.-B.-P. Motor Drive
- 72" x 35" Bement-Niles Triple Gear
- 60" x 35" Bement Triple Gear
- 54" x 34" Bement-Niles Triple Gear
- 42" N.-B.-P. Car Wheel Turning

- 18" x 10" Sidney Geared Head
- 20" x 42" Fay-Scott Gap
- 18" x 35" Fay-Scott Gap
- 16" x 8" Hendey Tool Room
- 14" x 6" Hendey Tool Room
- 14" x 6" P. & W. Pan, taper

MILLERS

- 1-No. 5 Cincinnati High Power
- 1-No. 5 Brown-Sharpe Plain
- 1-No. 5 Becker Brainard Plain
- 1-No. 4 Brown-Sharpe Plain
- 1-No. 3 Brown-Sharpe Plain
- 1-No. 3-B Hendey Plain
- 2-No. 2 Cleveland Plain
- 2-No. 2 Rockford Plain
- 2-No. 1 Cleveland Plain
- 2-No. 13 1/2" Garvin Plain
- 20-Hand Millers, all sizes
- 10-Manufacturing Millers
- 1-No. 2 1/2" LeBlond Universal
- 1-No. 2 1/2" Rockford Universal
- 2-No. 1 1/2" American Universal
- 2-No. 3 Cincinnati Vertical
- 1-No. 4 Cincinnati Vertical
- 1-No. 5 Brown-Sharpe Vertical
- 2-No. 6 Becker Vertical
- 2-No. 15 Garvin Vertical
- 1-No. 2 P. & W., Cam Cutting
- 1-Garvin, Cam Cutting
- 1-3B Lees-Bradner, Thread
- 1-24" x 24" x 10" Ingersoll
- 1-No. 2 Van Norman Duplex
- 1-No. 3 Garvin Duplex 60" feed
- 8-5" P. & W. Automatic

PLANERS

- 1-60 x 60 x 24 D. & H. Open-side
- 1-60 x 60 x 14 Powell Heavy
- 1-60 x 60 x 22 N.-B.-P.
- 1-60 x 60 x 12 Gleason
- 1-42" x 42" x 26" Pond Planer four heads, Rev. M.D.
- 1-36 x 36 x 20 Woodward-Powell, like new, reversing motor drive
- 1-36" x 36" x 14" N.-B.-P. Gear Box, 2 heads, Belt or M.D.
- 1-30 x 30 x 18 Cincinnati
- 1-24 x 24 x 12 American, 2 hds.
- 6-24"x24"x8'-8'-10" Whitcomb Second Belt Drive Planers

TURRET LATHES

- 3-24" Gisholt, Big Bore
- 2-5 1/2" Bardons-Oliver
- 1-2 1/2" Garvin, G.F.H.
- 3-2 1/4" x 11" Acme, G.F.H.
- 3-No. 3 W. & S. Turret
- 1-No. 3-A W. & S. Turret
- 6-3 x 36 Jones-Lamson Flat
- 1-3 x 36 Hartness Double Spindle
- 6-18" Libby Rapid Production
- 2-2 1/4" x 10" Millholland
- 1-No. 22 Garvin Monitor
- 1-5/8" x 4 1/2" Pratt-Whitney
- 7/16" x 2 1/2" P. & W. Turret
- 8-2" x 26" P. & W. Turret

SHAPERS AND SLOTTERS

- 1-26" Bement Traveling Head
- 1-32" Smith Mills Shaper
- 1-28" Queen City Shaper
- 2-24" Cincinnati Cone
- 1-24" Gould-Eberhardt Cone
- 1-20" Ohio Shaper
- 1-20" Kelly B.G. Cone
- 1-20" Smith Mills B.G.
- 1-16" American Motor Drive
- 1-16" Smith Mills Cone
- 2-36" Industrial Slotters
- 1-36" Bement Slotter
- 2-24" Bement Slotters
- 1-20" Bement Slotter
- 1-15" Newton Slotter
- 1-10" Bement Slotter
- 1-6" P. & W. Vertical Shaper

PRESSES

- 1-37 1/2" Bliss Straight Side
- 1-DDG55 Ferracute Drawing
- 1-21 Ton Wood Vertical Hydraulic
- 1-No. 2B Standard Double Act
- 1-No. 1 Bliss Toggle Drawing

GEAR CUTTERS

- 1-5A Lees-Bradner, M.D.
 - 1-48" Gleason Bevel Gear Planer
 - 1-60" Gleason Bevel Gear Planer
 - 2-No. 36 BM Gould-Eberhardt Gear Roughers
 - 1-36-8 G. & E. Rougher
 - 1-18" Gleason Planer 36" face
 - 1-24" x 10" G. & E. Hobber
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TIMKEN has to be an *ALL*-precision plant. Only finest types of machinery, perfectly maintained, permit Timken's noted large-scale precision output.

Used machinery offered by Timken has been very *well* used. It comes on the market only because Timken equipment is kept constantly modernized.

Each of the items listed is still good for years of fine operation—and priced to give you an astonishing saving. For quotations, write, call or wire.

Drilling Machines

- 1—Drilling Machine, Rockford, 20' Swing three-spindle
- 4—Drill Press, Bench Type, Rockford, 13' solid head, lever feed, adjustable table, square base
- 1—Drilling and Reaming Machine, Foote-Burt, continuous, 12-spindle

Electrical Equipment

- 1— $\frac{1}{2}$ HP G. E. 230-Volt D. C. motor
- 2—1 HP Crocker-Wheeler 230-Volt D. C. motor
- 1—2 HP Crocker-Wheeler 230-Volt D. C. motor
- 1—3 HP 230-Volt D. C. motor, Reliance Electric make
- 3—3 HP Crocker-Wheeler 230-Volt D. C. motor
- 1—4 HP Excell All Dynamo 6-Volt D. C. motor
- 2—5 HP Crocker-Wheeler 230-Volt D. C. motor
- 1—5 HP Ideal Electric 220-Volt A. C. motor
- 1—7.5 HP KW 125-Volt D. C. motor (Dillon Electric)
- 1—7.5 HP Crocker-Wheeler 110-Volt A. C. motor, with 5 KW 125-Volt D. C. generator
- 1—7.5 HP Ideal Electric, 220-Volt A. C. motor, Type A
- 1—7.5 HP Westinghouse 220-Volt A. C. motor, Induction, with 5 KW D. C. generator
- 1—11 HP Westinghouse 220-Volt motor
- 1—20 HP Crocker-Wheeler 230-Volt D. C. motor
- 1—20 HP Ideal Electric 220-Volt A. C. motor
- 1—20 HP Westinghouse 220-Volt motor
- 1—20-30 HP 220-Volt A. C. Starter Panel (Crocker-Wheeler)
- 1—25 HP Western Electric 220-Volt A. C. motor, Type KT-322
- 1—30 HP Crocker-Wheeler 220-Volt motor
- 2—30 HP Ideal Electric 220-Volt A. C. motor
- 1—30 HP Ideal Electric 220-Volt A. C. motor, Type A
- 2—30 HP Westinghouse 220-Volt A. C. Motor
- 2—40 HP Ideal Electric 220-Volt A. C. motor, Type A
- 2—50 HP Crocker-Wheeler 220-Volt A. C. motor
- 2—50 HP Ideal Electric 220-Volt A. C. motor
- 1—50 HP Western Electric 220-Volt A. C. motor
- 2—50 HP Westinghouse 220-Volt A. C. motor
- 1—75 HP G. E. Electric Starting Compensator 3-phase 2080/2300 Volt Primary, 832/1768 Volt—920/1955 Volt Secondary
- 1—75 HP Western Electric 220-Volt A. C. motor
- 1—G. E. 600-Volt Relay Panel
- 1—440/220 Volt single phase 60 cycle Electric Furnace Company transformer
- 1—2220/1320 Volt 60 cycles Westinghouse Starting 1200/1080 Volt 60 cycles Transformer

Grinders

- 1—Double end Grinder, Acme Machinery Co., small
- 1—Double end Grinder, Builders, 1' arbor, 34" between wheels
- 1—Double end Grinder, Foundry Type, Dow, 1 $\frac{1}{4}$ " arbor
- 4—External Grinder, Plain, Brown & Sharpe, No. 14
- 2—Hand Grinder, floor, double end, Sma I, Wilmarth & Morman, New Yankee
- 1—OD Grinder, Modern, 12" x 36"
- 1—OD Grinder, Modern, 12" x 48"
- 1—Surface Grinder, Brown & Sharpe, No. 13, with vise, countershaft

Grinders—Continued

- 1—Universal Grinder, Brown & Sharpe, No. 1, complete with countershaft
- 1—Universal Grinding Machine, Cincinnati No. 2, 12" x 36"
- 1—Universal Cutter and Reamer Grinder, Woods No. 2
- 1—Universal Grinder, small double end, with swivel table
- 1—Universal and Tool Grinder, Osterlein, No. 3, with vise and countershaft, no other attachments
- 1—Wet Tool Grinder, small, Edgemont

Lathes

- 1—Hand Turret Lathe, Bardons & Oliver, No. 1
- 1—Hand Turret Lathe, Warner & Swasey
- 1—Lathe, Lo-Swing, Fitchburg Machine made, single tool taper attachment complete with bracket
- 1—Turning Machine, Foote-Burt, 8-spindle
- 1—Turret Lathe, Bardons & Oliver No. 1, plain, with wire feed
- 1—Turret Lathe, Bardons & Oliver No. 6, power feed to turret, 3-step cone, friction back geared, wire feed, oil pump, other floors
- 1—Turret Lathe, Bardons & Oliver No. 1, plain head
- 1—Turret Lathe, Bardons & Oliver No. 2, with power feed to turret, back geared, friction wire feed

Milling Machines

- 1—Bench Miller, Burke
- 1—Milling Machine, Brown & Sharpe, with countershaft

Screw Machines

- 91—Automatic, National Acme No. 72, four-spindle
- 11—Auto Screw Machine, Acme No. 72
- 60—Roll Automatic, Acme Machine, No. 72
- 1—Screw Machine, Warner & Swasey No. 8, 3 $\frac{1}{2}$ "
- 1—Screw Threader, No. 30, purchased from Waterbury-Parrell Co.

Miscellaneous

- 1—Blower, Allis-Chalmers, direct connected to motor 13 E-1221-835-2, 3 HP 850 RPM Canton Plant
- 2—Bolt Threader, National Acme, No. 2
- 1—Chip Extractor, De Laval, Dravo-Doyle Co.
- 15—Gridley Automatic, 2 $\frac{1}{4}$ ", single-spindle, standard equipment, and counter-shaft
- 1—Multiple Separator, No. 600, Dravo-Doyle Co.
- 2—Oil Separator, Albert Curtis Co., Old Type
- 2—Oil Separator, American Oil Slinger Co., Old Type
- 1—Oil Separator, Curtis 1—Paper Baler, Economy, No. 15
- 1—Paper Baler, Economy, No. 30
- 1—Plain Press, Toledo Machine Co., No. 42, serial No. 9189
- 2—Rotary Pressure Blower Pump, Size 2, manufactured by Roods Co., Serials 35510, 35511, 35512, 35515, 1 pump equipped with Western Electric motor
- 1—Tapping Machine, horizontal
- 2—Threading Machine, Acme, horizontal
- 1—Wire Straightener, Shuster $\frac{5}{8}$ "

PURCHASING DEPARTMENT—THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

1100 SURPLUS HIGH GRADE USED MACHINE TOOLS

AT THE
COLTS PATENT FIREARMS PLANT

MUST BE DISPOSED OF IMMEDIATELY



WITH the recent completion of a large special contract by the Colts Patent Fire Arms Company these machine tools are no longer required. There is no place for them in their normal production schedule and the floor space they occupy is needed immediately for other purposes. There you have the real and only reason for this big sale—for the sacrifice of these unusually good used machine tools at the surprisingly low prices we are willing to let them go for, to effect quick disposal.

These machines have had excellent care in operation and will render continued service in your plant, of far greater value than the price we ask for them. Inspection of equipment is invited week days between the hours of 8 to 5 and up to 12 o'clock Saturdays, or at other hours by appointment. We advise early inspection for first choice of the equipment offered and immediate delivery. Come to Hartford to buy those machines you need—you'll save money!

Equipment Offered in This Sale Includes:

LATHES—122, Standard makes, all sizes and types.

DRILLING MACHINES—99, Standard makes in 1, 2, 3, 4 and 6 spindle, various capacities.

GRINDERS—69, Standard makes, Precision, Universal, Surface, Plain, Cutter, Drill, and Internal types.

MILLING MACHINES—196, Standard makes, Plain and Universal types. Various sizes, belt and gear driven.

HAND MILLERS—88, Standard makes, Bench and other types.

POLISHING MACHINES—48, Lathe, Bench and other types. Also 38 Polishing Jacks of Miscellaneous sizes and types.

PROFILING MACHINES—89, Pratt & Whitney, 2 spindle, Nos. 12 and 14.

SCREW MACHINES—70, Standard makes, Hand and Automatic types, various capacities.

SAWS—12, Standard makes, Power Hack, Cold Metal, etc. Various sizes and capacities.

SHAVING MACHINES—61, Horizontal Floor and Bench types.

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MISCELLANEOUS—Smaller quantities of miscellaneous machines include: Belt Lacers, Boring Machines, Chambering Machines, Lapping Machines, Barrel Leading Machines, Presses, Reaming Machines, Rifling Machines, Slitting Machines, Slotting Machines, Spinning Machines, Strapping Machines, Straightening Machines, Testing Machines, Threading Machines, Tumbling Barrels, Turning Machines, Wheel Washing Machines and Shapers.

WATCH FOR FUTURE ADVERTISEMENTS GIVING DETAILED SPECIFICATIONS ON INDIVIDUAL TYPES OF EQUIPMENT

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There's enough "reserve production" in Prentiss used machines to more than satisfy you. That is merely a part of the Prentiss policy.

Drills

No. 1—1 spindle Avey ball bearing.
No. 2—2 spindle Avey ball bearing.
1 spindle Henry & Wright ball bearing.
1 spindle Leland-Gifford, Ball Bearing.
No. 41—8 spindle Natco.
No. 30—10 spindle Natco.
No. 17—4 spindle Foote-Burt.
6 spindle Bickford.
24-in., 32-in. and 36-in. Cincinnati-Bickford upright.
30-in. American Radial.
36-in. and 36-in. American Radials.

Plain and Universal Grinders

6-in.x32-in. Norton plain.
10-in.x36-in. Norton plain.
10-in.x72-in. Norton plain.
No. 1 Brown & Sharpe universal.
12-in.x36-in. Cincinnati universal.
12-in.x36-in. Landle universal.

Surface and Cutter and Tool Grinders

No. 22—12-in. Heald, Surface.
No. 16 Blanchard, Surface.
No. 14 Pratt & Whitney, Surface.
No. 2 Diamond, Surface.
No. 3 Brown & Sharpe, Surface.
No. 6 Bealy, Disc.
No. 190 Wells, Cutter.
No. 1 Cincinnati, Cutter.
No. 2 Walker, Cutter.
No. 1 Greenfield, Cutter.

Turret Machines

1-in., 1½-in., 2¼-in. and 3¼-in. Acme.
1-in. and 1½-in. Pratt & Whitney.
¾-in. to 6-in. capacity, Cleveland Automatics.
¾-in., 3¼-in., 4¼-in. Gridley Automatics.

Vertical and Horizontal Boring Machines

24-in. Bullard vertical New Era.
30-in. King vertical.
72-in. Niles vertical.
102-in. Poole vertical.
5-in. Bar Barret horizontal, cylinder type.

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Nos. 19 and 21 Bliss.
No. 2½ Billings & Spencer (Trimming.)
3-in. capacity Long & Allstatter Bar Iron Shear.

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24-in.x6-ft. Ohio Planer.
30-in.x6-ft. Gould & Eberhardt Planer.
30-in.x10-ft. Flatther Planer.
30-in.x8-ft. Whitcomb Planer.
36-in.x10-ft. Woodward & Powell Planer.
42-in.x8-ft. Woodward & Powell Planer.
48-in.x12-ft. Powell Planer.
72-in.x20-ft. Pond Planer.
16-in. and 24-in. Gould & Eberhardt Shaper.
16-in. and 20-in. Cincinnati Shaper.
20-in. American Shaper.
20-in. Cincinnati Shaper, traveling head.

Lathes

12-in.x5-ft. Hendey.
14-in.x8-ft. Lodge & Shipley.
16-in.x6-ft. American.
16-in.x6-8 and 10-ft. Lodge & Shipley.
16-in.x8-ft. LeBlond.
16-in.x7-ft. LeBlond.
20-in.x8-ft. Lodge & Shipley.
20-in.x8 and 12-ft. American.
24-in.x10 and 22-ft. Lodge & Shipley.
30-in.x12-ft. Lodge & Shipley.
38-in.x20-ft. Schumacher-Boye.
42-in.x20-ft. H. C. Fish.
30-in.x22-ft. Lodge & Shipley, heavy forge type.

Plain and Universal Millers

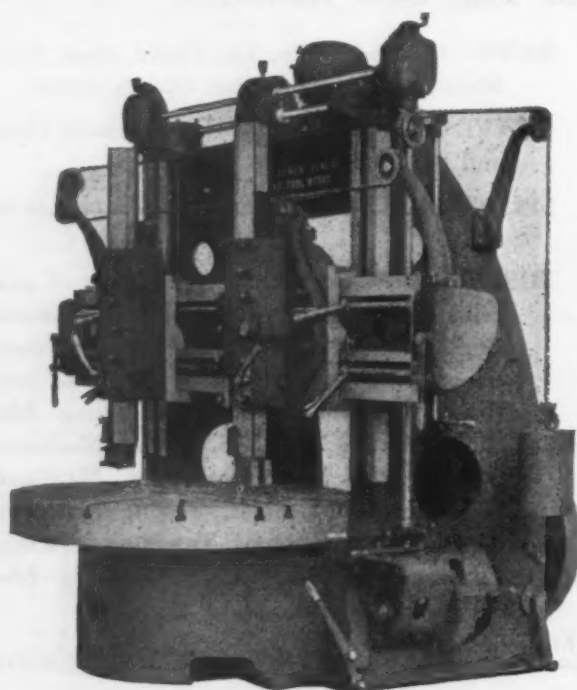
No. 0-½ Cincinnati plain.
Nos. 2, 3 and 4 Cincinnati plain.
Nos. 1, 2 and 3 Brown & Sharpe plain.
No. 1 Kempsmith universal.
Nos. 2 and 3 Hendey universal.
No. 2 Cincinnati universal.
No. 3-A Brown & Sharpe universal.

General Miscellaneous

No. 2 Baker Bros. Keyseater.
3-in. and 6-in. Cutting-off Machines.
2-in. Acme Bolt Cutter.
2½-in. Acme Bolt Header.
No. 2 Garvin automatic tapper.
No. 75 Heald internal grinder.
No. 60 Heald cylinder grinder.

Write for price quotations, specifications and photographs of any of above or other machines, in which you may be interested.

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Late Model—
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Foot-Burt, 16" swing, three spdl. 75.00
Geo. Burnham, 13" swing, three spdl. 50.00
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Cincinnati No. 3 375.00
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2—CLEVELAND 1 1/2" Model B.
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1—NEW BRITAIN 1x5 Bar.
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1—BAHN-LARMON 18x14".
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1—AMERICAN 20x10", S.P.D.
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These machines are all in good condition—May be inspected here at our warehouse at New Haven
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- 1—% CLEVELAND
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- 1—No. 3 LUCAS
- 1—No. 3 LUCAS—3" Bar—S.P.D.

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- 16" P. F. CHAMPION
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- 5—20" BARNES
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- 1—24" ROCKFORD
- 33—24" SUPERIORS
- 6—24" BARNES
- 2—No. 15 1/2" FOOT-BURT
- 4—25" BARNES
- 2—26" BARNES
- 3—28" SUPERIOR
- 3—28" BARNES
- 5—30" SUPERIOR
- 4—34" FOOT-BURT
- 2—34" AMERICAN
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- 1—ACME
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- 1—30" AMERICAN Radial
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- 1—4" D. W. Radial
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- 1—ANDREWS Straight Line Gang Drill
- 1—No. 1 BAUSH
- 1—No. 2 FOX
- 1—No. 2 MOLINE
- 1—No. 2 MOLINE
- 1—No. 3R MOLINE
- 1—No. 13 NATCO
- 2—BAUSH No. 30 Horizontal
- 1—No. 4 BAUSH

Forging Equipment

- 1—High Speed Muffle Furnace and Cyanide Bath
- 5—No. 7 1/2" BELLEVUE Oil Burning Furnaces
- 1—No. 50 CONNESVILLE Blower
- 1—No. 60 CONNESVILLE Blower
- 1—CHICAGO Pneumatic Air Compressor
- 1—6x6DeD Vilviss Air Compressor
- 2—CURTIS 10x10—3 Cylinder Vertical Compressor
- 1—ROOF No. 4 Pressure Blower
- 1—200 lb. BRADLEY Hammer
- 1—1200 lb. WILLIAMS & WHITE Board
- 2—1500 lb. WILLIAMS & WHITE Board
- 2—2000 lb. CHAMBERS-BURG Board Drop
- 1—2000 lb. CHAMBERS-BURG Steam
- 1—3000 lb. ERIE Steam

Grinders

- 21—Floor Type Grinders—BLUNT DIAMOND and NORTON makes
- 2—6x32 NORTON Plain
- 9—10x20 LANDIS Plain
- 2—No. 13 BROWN & SHARPE Plain
- 2—No. 1 REEVES Roll Grinders
- 1—CAPITOL Grinder
- 6—10x24 NORTON
- 1—12x24 MODERN Plain
- 2—No. 3 CINCINNATI
- 2—10x45 LANDIS Plain
- 2—10x50 NORTON Cam
- 1—12x52 LANDIS Plain
- 1—12x36 LANDIS Plain
- 1—12x42 LANDIS Cam
- 1—10x48 LANDIS Cam
- 2—10x50 NORTON Crank
- 2—BANDFORD Centerless
- 1—No. 4 GARDNER Disc
- 1—FOOT-BURT Valve Grinding Machine, 6 spindles
- 1—No. 17 BRESLEY Double Head Disc
- 1—DIAMOND Table 24" wide x 13 1/2" long
- 1—No. 50 DISFANCE Valve Grinding Machine, 4 Spindles
- 1—No. 2 CINCINNATI Plain 12x36
- 1—YANKER Drill Grinder
- 1—No. 2 MODERN Universal
- 1—GOLD & BERNHARDT Hob

Internal Grinders

- 3—No. 50 HEALD Cyl.
- 5—No. 60 HEALD Cyl.
- 2—No. 75 HEALD Int.

Tool and Cutter Grinders

- 1—CINCINNATI Universal
- 2—INGERSOLL 24" Tool
- 1—WASHBURN
- 2—WILMARTH & MARION Drill
- 1—LABALLE Die
- 1—WILMARTH & MARION Surface
- 1—WALKER Single Stroke
- 1—14x22 PRATT & WHITNEY
- 2—18" WEBSTER & PERKS Tool
- 1—No. 1 WILLEY Electric Tool
- 1—No. 6 FORRES & MEYERS Tool

Lathes

- 4—Speed Lathes
- 1—18x8 AMERICAN
- 1—18x10 AMERICAN
- 1—16" AMERICAN
- 1—14x5 HENDEY
- 1—14x6 HENDEY
- 1—14x6 LEBLONDE
- 1—15x6 BRADFORD
- 1—14x6 BRADFORD
- 1—15x6 BRADFORD
- 2—16x6 CHARD MFG.
- 1—16x6 LEBLONDE
- 3—16x7 CHARD MFG.
- 1—16x8 AMERICAN
- 1—16x8 BRADFORD
- 1—16x8 HENDEY
- 4—16x8 MILWAUKEE
- 2—16x8 FOULTON
- 5—16x8 SOUTH BEND
- 1—16x8 CHARD MFG.
- 1—17x8 SIDNEY
- 1—18x6 AMERICAN
- 2—18x6 CHARD MFG.
- 1—18x7 MILWAUKEE
- 1—18x8 SIDNEY
- 2—18x8 HENDEY
- 1—18x8 GREAVES-KLUBMAN
- 1—18x8 CINCINNATI
- 8—18x8 MILWAUKEE
- 2—18x8 HAMILTON
- 2—18x8 LODGE & SHIPLEY
- 4—18x11 CHARD MFG.
- 2—20x11 CHARD MFG.
- 1—20x14 AMERICAN
- 1—22x18 REED
- 1—22x14 REED
- 1—22x10 MILWAUKEE
- 1—24x10 NEW HAVEN
- 1—24x12 DAVIS & BOAN
- 1—BARNES Gap 14x24x 5 1/4" Bed
- 1—BAHN-LAMON Gap 18x 34x12 1/4" Bed
- 7—3 1/2"x60 LO-SWINGS

Milling Machines

- 3—WHITNEY Hand
- 2—No. 60 BROWN & SHARPE Hand
- 2—No. 8 STEPTOE Hand
- 2—No. 12 BROWN & SHARPE, Lincoln Type
- 1—No. 2 KEMPSMITH
- 2—No. 14A GARVIN Plain
- 1—No. 3 KEMPSMITH
- 1—No. 34 OHIO Heavy Duty
- 1—No. 5B BROKER Vertical
- 1—No. 3 LEBLONDE Universal
- 2—No. 33 KEMPSMITH
- 1—PRATT & WHITNEY Twin Type Spline
- 2—BREAM & SMITH Large Double Face Mill
- 1—No. 15 GARVIN Planer Type Slab Mill
- 1—INGERSOLL 20x20x18"
- 1—INGERSOLL 30x30x18"
- 1—INGERSOLL 20x20x14"
- 1—SA GARVIN Universal
- 1—BEPEN-LUCAS
- 2—PRATT & WHITNEY
- 1—RYERSON-CONRADSON
- 1—No. 1 1/2" ENIGHT Milling and Drilling Machine
- 1—No. 2 CINCINNATI Plain

Screw Machines and Turret Lathes

- 1—No. 2 BROWN & SHARPE Turret
- 1—WARNER & SWASEY No. 14
- 1—PRATT & WHITNEY Turret
- 1—No. 1 WARNER & SWASEY Old Type

- 2—No. 2 WARNER & SWASEY Old Type
- 1—No. 3 WARNER & SWASEY Universal
- 1—No. A-21 1/2" Spindle GISHOLT
- 1—No. 3 BARDONS & OLIVER Hand
- 1—No. 4 BROWN & SHARPE Turret
- 1—No. 4 CINCINNATI Hand
- 2—No. 4 MILHOLLAND
- 2—No. 4 WARNER & SWASEY Universal
- 1—No. 6 WARNER & SWASEY
- 1—No. 7 WARNER & SWASEY Universal
- 1—No. 8 WARNER & SWASEY Universal
- 4—3A WARNER & SWASEY Universal
- 6—6A POTTER & JOHN-SONS
- 3—21" GISHOLTS
- 5—24" GISHOLTS
- 1—3 1/2"x26 JONES & LAMSON
- 1—3 1/2"x36 JONES & LAMSON
- 1—2 Spindle JONES & LAMSON
- 2—JONES & LAMSON Double Spindles
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- 2—No. 12 BARBER-COLMANS
- 4—13" GIBSON Spiral Bevel Gear Generators
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- 1—13" RELLARD Multi-Matic

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- 1—MANVILLE Thread Roller
- 1—ACME 1/2" Tapper—8 spindle
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- 1—BENCH for Drills — Pump and Piping for Compound
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18" x 11" Chard Heavy Duty Q.C.
16" x 8" Lodge & Shipley Q.C.
14" x 6" Hendey Q.C. with Taper.

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No. 3 R. K. LeBlond Universal complete.
No. 3B Heavy Brown & Sharpe Plain Single Pulley.
No. 3 Kempsmith Plain—with Vertical Attachment and Rotary Table.
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3" Prentice Bros. Radial Speed Box.
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24" Cincinnati Bickford Drill Speed Box Drive.
24" Aurora Drill with Tapping.
23" Rockford Drill with Tapping.
22" W. F. & John Barnes Drill.
6 Spindle Henry & Wright Ball Bearing Drill.

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6" x 32" Norton Plain Grinder.
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18" x 12" Gould-Eberhardt Gear Hobber.
24" Gould-Eberhardt Spur Gear Cutter.

Miscellaneous

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Bolt Threading Machine with Lead Screws.
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Pittsburgh Lathe 27" x 12'

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Dbl. Cam Action Press 4" Stroke

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Gould & Eberhardt 20" B. G. Cr. Shaper

Springfield 16" Shaper

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Lathe, 18" x 10" Whitcomb-Blaisdell, G.H., SPD.
Lathe, 24" x 10" Boye & Emmes, G.H., M.D.
Lathe, 24" x 22" American, Grd. Head, M.D.
Miller, No. 2 Cincinnati Plain, Vert. Att.
Pinion Rougher, Gould & Eberhardt 36 BM.
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Press, No. 54 Toledo Trimming.
Press, No. 55 Toledo Trimming.
Press, No. 78½ Bliss, S.S., 36" Bet. Uprights.
Press, No. 305 Bliss, Geared, 3" Stroke.
Press, No. 1½ Bliss Toggle Drawing.
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Drill with variable speed motor.
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Motor.
1—24" x 6' Gray Planer with one head.
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- 1—20" 2 Spindle Colburn Gang No. 2
- 2—No. 1 Baush Multiple Spindle
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- 1—No. 5D Moline 3 C W Heads
- 1—Twin 8 Spdle. Moline Rail Drill

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- 1—No. 14 Brown & Sharpe Plain
- 1—No. 3 Brown & Sharpe Univ.
- 1—No. 2 Cincinnati Plain
- 1—No. 4 VanNorman Internal
- 1—No. 85 Heald Internal
- 1—30" Diamond Face Grinder
- 1—15A Bryant Chucking and Face

MISCELLANEOUS

- 1—84" Dia. Newton Rotary Miller
- 1—No. 3 and 4 Cincinnati Vertical Millers. S.P.D. Quick Return
- 1—No. 0 Brown & Sharpe Screw Machine
- 4—No. 4 Warner & Swasey Screw Machine M.D.
- 1—No. 396 Niagara Power Squaring Shear
- 1—400 Lb. Billings & Spencer Board Drop Hammer
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We have a large stock of wire screening for stock rooms complete with service doors and windows.

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No. 2B Foster Universal Turret.....	\$1,450
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16"—18"—20" and 24" Shapers.....	1,275
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All Sizes of Lathes, Planers, Milling Machines, Shapers, Drill Presses, Punch Presses, etc.	
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SPECIAL LOW PRICES

Lathes, Shapers, Planers, Millers,
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- 12" x 72" Norton Plain Cylindrical Grinder.
- 14" x 50" Norton Plain Cylinder Grinder.
- 30" Aurora Upright Sliding Head Drill.
- 3' Fostick Plain Radial Drill, Gear Box.
- 3' Reed-Prentice Radial, latest type.
- 4' Reed-Prentice Plain Radial, M. D. (2).
- 7' Cincinnati-Bickford Plain Radial Drill.
- 24" Hollingsworth Back Geared Crank Shaper.
- 36" x 30" x 10' Newton Slab Miller.
- No. 2-M Potter & Johnson Automatic Millers.
- No. 5 B Brown & Sharpe Plain Miller.
- No. 3 Becker Vertical Miller, Belt Driven.
- No. 2 Pratt & Whitney Vertical Die Sinker.
- No. 1 Cleveland Plain Miller S.P.D. (2).
- 24" Brown & Sharpe Gear Cutter.
- 37" Bullard Vertical Boring Mill.
- 42" Bullard Rapid Pro. Vert. Bor. Mill.
- 42" Bullard Vertical Boring Mills.
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MISCELLANEOUS

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- 15—Bullard Turret Lathes
- 1—18" Prentice Chucking Lathe
- 3—No. 2 Baird Tilting Tumblers
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- 42 in. COLBURN 1 heads
- 3 in. bar Niles horizontal

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We are headquarters for New and Used Pipe Threading Machines.
ALL MAKES.

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20" Davis Drill B.G.P.F.
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Taylor & Fenn Type "C" Drill
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20" x 8' American Geared Head Lathe
18 x 8 Prentiss Lathe
16 x 10 Champion Lathe
16 x 8 Davis Lathe
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14 x 6 Wolcott Lathe
14 x 6 Sidney Lathe
No. 20 American Saw Table
Pettingell Tenoner
Cordesman Saw Table
No. 2 Clement Saw Table
6" Rowly & Herman Sticker
American 2-spindle Shaper

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ALL LIKE NEW

No. 4 Cincinnati Plain 16 x 72.
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No. 1 Bath Universal Cutter—Tool
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No. 103 Rivett Internal.
Walker Rotary Surface—10" magnetic
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Machinery Division
125 E. Second St. Dayton, Ohio

Lynd-Farquhar Co.

Boston

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No. 1½ Brown & Sharpe, Plain
No. 3 Cincinnati, Plain
No. 4 LeBlond, D.B.G., Plain
Type M-9 Newton Duplex
4-head Newton, Planer type
No. 6 Whitney hand
Becker Verticals No. 2A, No. 6 belt drive, and
motor drive, No. 5-B, Model CS and Model
C-1

No. 2 Cincinnati and Brown & Sharpe Verticals

GRINDERS

No. 60 Heald Cylinder
No. 14 7"x48" Brown & Sharpe, Plain
12"x36" Modern, Plain, self-contained
No. 4 Gardner Ball Bearing, Disc
No. 7 Gardner Plain Bearing, Disc
No. 40 Bryant Wide Wheel, External
No. 70 Heald Internal
Style C Rogers, 60", Knife
No. 2 Reid, Surface
No. 2 Wilmarth & Morman Auto. with chuck
No. 12 Brown & Sharpe Universal Tool Room

DRILLS—RADIAL

3½' Morris, gear box drive
5' Western Plain, S.P.D.
7' Lynd-Farquhar Wall Type

DRILLS—UPRIGHT

20" Barnes, B.G., P.F., latest type
26" Barnes
28" and 30" Blaisdell, Sliding Head
28" Sibley, S.H.

DRILLS—SENSITIVE

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Reed
4-spindle Barr, plain bearing
4-spindle Henry & Wright, B.B.
6-spindle Reed (Barr type)

MISCELLANEOUS

AIR COMPRESSOR—Blaisdell 16"x10"x10"
BOLT CUTTER—Reliance 3"
HAMMER—Beaudry No. 4, 100 lb. Champion
type
HOIST—Canton No. 4 Portable
KEYSEATER—Catlin No. 0
PIPE MACHINE—No. 6 Bignall & Keeler
COLD SAWS—No. 2B and No. 4B Cochrane-Bly
POLISHING MACHINE—Production type F
SHAFT STRAIGHTENER—Corey No. 3, cap. 6"
SHEAR (POWER SQUARING)—6' Niagara, No.
10 gauge
SLOTTER—Newton 6" (NEW)

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12" Williams motor driven.
8" Williams motor driven
8" Oster belt driven.
8" Oster motor driven.
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6" Easton Cole & Burnham belt.
2—6" Williams motor driven.
6" Jarecki belt driven.
6" Oster motor driven.
2—6" Oster belt driven.
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2—4" Jarecki motor driven.
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4" Oster motor driven.
4" Jarecki belt driven.
2" Jarecki belt driven.
2—2" Oster motor driven.
2—2" Oster belt driven.
2" Oster arranged for hand or power.
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dies 4 to 10 in.
8 in. COX dies 2½ to 8 in.
8 in. WILLIAMS dies 2½ to 8 in.
6 in. SAUNDERS dies 1½ to 6 in.
4 in. VICTOR dies 1 to 4 in.

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Jersey City, New Jersey



A few of the machines
in stock, on which we
can quote

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44" Baush, 2 swivel heads.
60" Niles, 2 swivel heads.
3½" Bar Rochester, horizontal.
5" Bar Beaman & Smith horizontal.
Morton floor type, boring, drilling, mill-
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Nos. 4 and 25 Williams & White
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1" and 2" Ajax upsetters.
250-ton Mesta steam hydraulic.

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24" to 32" sliding head.
No. 25, 24" Foote-Burr, 3" cap.
5" Bickford plain radial.

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No. 3 Landis, universal.
18"x96" Norton plain grinder.
84" Diamond surface grinder.

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16" to 20" tool-room, in stock.
25"x12" LeBlond, heavy duty.
32"x18" Schumacher & Boye.
32"x32" Bridgeford, motor drive.
42"-60"x34" Houston Stamwood &
Gamble, motor drive.

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Style B Briggs Lincoln type.
No. 3 Brown & Sharpe, plain.
No. 3B Heavy Brown & Sharpe, SPD.
No. 4 Cincinnati hi-power, vertical.

PLANERS and SHAPERS

30"x30"x8' Gray, single head.
48"x48"x18' Pond, four heads.
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20" American backgeared shaper.

TURRET LATHES

21" Gisholt, cone drive.
2"x26" Acme flat, motor drive.
3"x36" Jones & Lamsons.
No. 4 Bardons & Oliver.

MISCELLANEOUS

100-lb. Bradley helve hammers.
No. 66 Consolidated Press.
48" Newton Cold Saw.
54" Niles-Bement-Pond Slotter.
No. 3 Hilles & Jones angle shear.



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Cincinnati Acme Turret
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- 7—1 in. x 7 in. plain head screw machines with power feed to turret.
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- 3—1½ in. x 9 in. friction back geared screw machines with power feed to turret.
- 1—18 in. friction back geared turret lathe with pan and pump and power feed to turret and 8 in. 2-jaw Hannifin air chuck equipment.
- 1—2½ in. x 26 in. friction back geared cone head flat turret lathe with equipment for bar work.
- 1—2½ in. x 26 in. friction back geared cone head flat turret lathe with plain equipment.

NOTE: Screw machine equipment includes automatic chuck, one collet, stock feed, pan, pump and piping and countershaft. Prices f.o.b. Cincinnati.

The Acme Machine Tool Co.
Cincinnati, Ohio

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- 30" Diamond Face Grinder.
- 4—No. 65 Heald Cylinder Grinders.
- No. 6 Rivett Internal Grinder.
- Springfield Rotary Surface Grinder, Table 43" dia.
- 6—No. 6A Potter and Johnston Semi-Automatics.
- 4—18" x 6' Fox Monitor Lathes.
- 25" x 10" LeBlond Combination Turret Lathe.
- 2½' Morris Radial Drill.
- No. 65-D-5 Moline Rail Drill.
- No. 4 Fox Drill, 24 spindles.
- 4—2" Model B Cleveland Automatics.

Complete Stock.

Send us your inquiries.

Riverside Machinery Depot
251 St. Aubin Ave., Detroit, Michigan

- No. 60 Heald Cylinder Grinders.
- 12 x 72 Cincinnati Universal Grinder.
- 42" American Band ReSaw.
- No. 4 Beaudrey Hammer.
- 3—Williams & White No. 400 Air Hammers.
- Landis 6 x 18 Self Contained Grinder.
- 3½" x 36" Acme Flat Turret Lathe, full bar and checking equipment, single pulley drive, roller feed, all geared head, cross feed stops, 15" Chuck master collet, full set collet pads, 15 tool holders.
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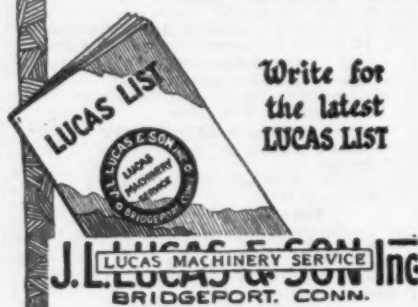
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REBUILT - GUARANTEED MACHINERY

Machinery You Can Depend Upon

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4—6x32 Brown & Sharpe.....	\$450
1—7½x72 Brown & Sharpe.....	1,250
1—12x24 Modern	875
1—10x50 Norton	700
1—10x80 Norton	1,250
Universal	
2 No. 1 Brown & Sharpe 10x24.	475
15—No. 3 Taft-Pierce 10x20....	475
1—No. 3 Cincinnati, 12x48....	875
Surface	
1—12" Pratt & Whitney Vert..	750
1—No. 3 Diamond, 12x12x48..	1,250
Internal	
4—No. 1 Landis, chuck cap.	
11½"	800
2—60 Healds, Cylinder	900



A Selection

- 24" Bullard vertical turret lathe.
- No. 85 Heald internal grinders.
- 6" x 32" Norton plain grinder.
- 16" x 48" Landis crank pin grinder.
- No. 0 Mitts & Merrill keyseater.
- No. 1½ Knight drilling and milling machine.
- 36" American sens. radial drill.
- No. 2B Brown and Sharpe miller.
- No. 5 & 6 Becker vertical millers.
- No. 1 and 2 Consolidated presses.
- No. 55 Adriance dble. crank presses.
- No. 169¼ Toledo toggle press.
- No. 666 Toledo toggle embossing press.
- Double end punch, ¾ in ¾, 16" throats on each end.
- Several lathes, drills, screw machines.
- Send for our latest list.

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1—72" x 72" x 30' Sellers Planer, 4 heads, belt drive.

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Large Boring Mill

8' Extension to 12' Betts Vertical Boring Mill, heavily reinforced housings, 2 swivel heads, belt driven, geared feeds, table 8½" thick, face of cross rail 18"; complete, in unusually good condition. Price extremely attractive if sold before removal.

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Grinder

10" x 72" Norton Plain, overhead countershaft, used eight months.

Boring Mill

60" Bausch, heavy, quick change feeds, complete motor drive.

A. F. Strafer
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- 24" Baker Heavy Duty
- 2" American Radial, swing table
- 6" Gang Radial
- No. 61 B Harrington 24 spindles
- 2 Spindle Cincinnati B.B.
- 2 Spindle Avey B.B. Bench

LATHES

- 17 x 8 Sidney Q.C.G.
- 18 x 8 G & K Q.C.G.
- 18 x 8 Hamilton Q.C.G.
- 18 x 12 Hamilton Q.C.G.
- 25 x 14 Le Blond Q.C.G.
- 30 x 14 Le Blond Q.C.G.
- 32 x 14 Wickes Q.C.G.

BORING MACHINES

- Universal 2½" bar
- Lucas 3" bar
- Rockford No. 2

BROACHING MACHINES

- No. 1 J. N. La Pointe
- No. 3 American

FOX LATHES

- No. 2 W & S 16" swing
- No. 3 W & S 18" swing

MILLERS

- No. 34 Ohio plain
- No. 3 Kempsmith plain
- No. 2 Cincinnati vertical
- No. 3 Cincinnati vertical
- Model C Becker vertical
- Model AB Becker vertical

Bargains—Prices Right

- 18x8 Lodge & Shipley 3 Step Cone, Q.C.
- Bullard Multi-Matic A-1 condition.
- No. 2½ Rockford Universal Miller.
- 42" Gisholt Boring Mill.
- 16" Milwaukee Shaper, Cone Drive.
- 12x36 Cincinnati Universal Grinder.
- 12x48 Cincinnati Universal Grinder.
- 56x56x32 Cincinnati Planer, 4 heads, complete reverse, motor drive and control.
- 54"x48"x24" Woodward & Powell Planer, 4 heads, belt drive.
- 4½" Cleveland Automatic.
- 1½" Cleveland Automatic.
- No. 2 and No. 3 Cincinnati Vertical High Power Millers.
- 10x72 Norton Plain Grinders.
- 15—5A and 6A Potter & Johnstons.
- No. 4 Becker Vertical.
- No. 642 Niagara Shear No. 10 gauge cap.
- No. 4 Ohio Universal Miller.
- 10' Ohl Brake.
- Bath Spline Shaft Grinder.
- No. 14 Gardner Ball Bearing Dbl. Disc Grinder.
- 2—6" Cleveland Automatic Model A.

CRANE

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OWENS, INC.

Buffalo—Rochester—Syracuse

Get more use out of your
floor space by selling used
machinery and equipment you
don't need, through the Clear-
ing House Section.

These Tools Were in operation Less than two years.

- 2—100,000-lb. capacity Draw Benches, built by the Standard Engineering Co. Cast iron bed, triple back geared motor drive. Will draw a bar about 28-ft. long. Arranged with tube trough. Practically new.
- 2—50,000-lb. capacity twin Draw Benches, practically the same as above, except arranged to draw two bars at one time.
- No. 2 Etna Rotary Swaging Machine.
- 300-lb. Bradley Compact Hammer.
- 400-lb. Yeakley Air Hammer.
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- 30" x 16-ft. Lodge & Shipley Engine Lathe, selective head, belted motor drive on head, taper attachment. With 15 H.P. Crocker-Wheeler motor, 440 volt, 60 cycle, 3 phase.
- 14" x 6-ft. Sidney Heavy Duty Engine Lathe, Q.C.G.
- 15" x 12-ft. Sidney Heavy Duty Engine Lathe, Q.C.G.
- 2—17" x 8-ft. Sidney Heavy Duty Engine Lathes, Q.C.G.
- 20" Gould & Eberhardt Heavy Duty Shaper.
- 10" x 36" Thompson Self-Contained Grinding Machine with complete Universal equipment.
- No. 4 Bridgeport Wet Tool Grinder.
- American Swing Saw, motor drive.
- 2-ton Shepard Electric Hoist, 230 volts D.C.
- 4—No. 10 Class L Chicago Pneumatic Geared Air Hoists.
- General Electric Centrifugal Compressor, type TI-2100 cu. ft. 1½-lb., 3450 R.P.M.; with General Electric Motor. 440 volts, 60 cycle, 3 phase, type K.T., 3600 R.P.M.
- 120-ton Howe R.R. Track Scale. New. Never installed.

F. H. CRAWFORD & CO., INC.
50 Church Street New York City

Any

second-hand

machinery or

equipment

for sale?

If so, see

advertising rates

on first page

of Section 51.

No. 408A BLISS DOUBLE CRANK TOGGLE

72" BETWEEN UPRIGHTS TIE ROD
STROKES 10" and 15"
WEIGHT 114,000 LBS.
USED LESS THAN TWO MONTHS

*Low Price
Immediate Shipment*

Joseph HYMAN and Sons

RICHMOND ST. and ERIE AVE.,
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PHONE REGENT 7728

We Have for Sale the Following Items:

- 1—No. 8-A Double Crank Rockford Press.
- 1—Geo. A. Ohl 10 ft. Gang Punching Attachment Complete, New.
- 1—Arc Welder, Type L. W., 3 K. W., 100 Amp., 220 Volts, 60 Cycle.
- 1—Allis Chalmers Co. 18" x 30" Horizontal Corliss Engine.

We also have for sale or trade a stock of wood screws, machine screws, mandrels, taps, drills and dies. If you can use this, please write for complete list.

F. S. BETZ CO.
Hammond, Ind.

BLISS 1½B TOGGLE DRAWING PRESS

Double geared; 21" between uprights; 10½" stroke of plunger; 6½" stroke of blankholder; geared, 15 to 1; weight 10,200 lbs.

In A-1 condition.

Bargain for immediate sale.

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One (1)—LOGEMANN BROS. Scrap Metal Press No. 12P—including No. 19-A Pump, Accumulator, Fluid Tank and Operating Valve—10 H.P. 220 V., D. C. Motor for 5" x 5" x 13" bale—in good condition—\$1,000.00.

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510 Main St., Bridgeport, Conn.

Ideal Bargains

- SHEET METAL WORKING TOOLS**
- 1—4' Royerson Power Brake, 14 gauge cap. \$200.00
 - 1—8' Royerson Power Brake, 10 gauge cap. 300.00
 - 1—No. 300 Peck, Stow & Wilcox 36" Power 100.00 shear
 - 1—Peck, Stow & Wilcox Rotary Shear, 15" gap, capacity of cutting 1/16" stock. 80.00

Ideal Machinery Co.
EAST MAIN ST., PLAINVILLE, CONN.

CHOICE POWER PRESSES

AT ATTRACTIVE PRICES

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DOUBLE CRANK GEARED
3-in. STROKE, BED 72-in. by 20-in.
WEIGHT 34,900 LBS.
USED 6 MONTHS

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150 TON KNUCKLE JOINT
1¼" STROKE
WEIGHT 8,850 LBS.
LIKE NEW

2—No. EG-54 FERRACUTE

400 TON KNUCKLE JOINT
2" STROKE
WEIGHT 16,500 LBS.
EXCELLENT CONDITION

1—No. 666 TOLEDO

1,000 TON KNUCKLE JOINT
TIE ROD, 2¼" STROKE
WEIGHT 90,000 LBS.
USED 18 MONTHS

1—No. DDG-56 FERRACUTE

100 TON CAM DOUBLE ACTION
5" AND 10" STROKES
WEIGHT 15,000 LBS.
FINE CONDITION

1—PG6 FERRACUTE

GEARED, 100 TON PRESSURE
WEIGHT 13,500 LBS.
NEW CONDITION

2—No. 202 BLISS

AUTOMATIC WITH COMBINATION
TRANSFER AND LATERAL FEED
5 DIE SLIDES, 5" STROKE
WITH TIE ROD, GEARED
WEIGHT 8,500 LBS.
PERFECT CONDITION

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STRAIGHT SIDE, TIE ROD
4¼" STROKE
WEIGHT 20,000 LBS.
PRACTICALLY NEW

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S.S. DOUBLE GEARED
4" STROKE
WEIGHT 50,000 LBS.
USED 8 MONTHS

Over 1200 Presses in Stock

**DON'T FAIL TO SEND
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Write for Complete List

Joseph HYMAN and Sons

PRESS SPECIALISTS
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For Rent

8"-12", 5-stand, 3-high Rolling Mill, Joliet, Ill., complete and ready to operate.

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126" x ¾" United Engr. & Fdy. Co., 30" throat. Motor drive with Motor. Modern and fine condition.

Fitzsimmons & Cole Machinery Co.
1208 House Bldg. Pittsburgh, Pa.

MUST BE SOLD

- 10 ft. 10 gauge Loy & Nawrath Power Brake.
- 10 ft. 10 gauge Loy & Nawrath Power Squaring Shear.
- 36 in. Gisholt Vertical Turret Lathe. These Machines in first class condition.

Mid-West Machine Tool & Supply Co.
Davenport, Iowa

FOR SALE

TOOLS FOR STRUCTURAL IRON WORK

PUNCHES

AND

SHEARS

- 1—Hanna Air Riveter, 102" reach.
- 5—14" Radial Countersink Drills, 3 motor drive, but without motor, 2 with 5 H.P., 220 volt D.C. motor.
- 1—CP & R Style X Manhole Punch, 22" x 30", with 20 H.P., 220 volt D.C. motor.
- 1—10" ASB Coping Punch, belt drive.
- 1—Cold Press, capacity 24" I Beams.
- 1—19" Liner Bar Machine.
- 1—No. 6-60 Quickwork Rotary Shear, capacity 1", with 15 H.P. 220 volt, D.C. motor.
- 1—Hilles & Jones No. 2 Horizontal Punch, 8" Throat, belt drive.
- 1—Berry & Son Punch, 42" Throat, belt drive.
- 2—Long & Aistatter Punches, 48" Throat, belt drive.
- 2—Southwark Punches, No. 5-48" Throat, belt drive.
- 2—Southwark Punches, No. 5-48" Throat, 10 H.P., 220 volts, D.C. motor.
- 1—Southwark Punch, No. 5-60" Throat, 10 H.P., 220 volt, D.C. motor.

Subject to Prior Sale and Inspection.
For further information address:

**THE AMERICAN
SHIP BUILDING COMPANY**
CLEVELAND, OHIO

- UPSETTERS: 1" to 4"
- BULLDOZERS: Williams White Nos. 1, 2, 3, 4, 5 and 7
- BRADLEY HAMMERS: 40 to 200-lb. Cushioned Helve. 30 to 500-lb. Upright
- NAZEL AIR HAMMER: No. 4B
- PRESSES: 2—No. 55½ Toledo, belt drive, geared
- 2—No. 57 Toledo, belt drive, geared
- PLATE SHEAR: Bertsch, capacity 8' x 1", equal to new
- THREADING MACHINES: Single and double spindle Landis, 1" to 2"
- WATERBURY-FARREL COLD PUNCHED NUT MACHINES
- THREAD ROLLERS
- VERTICAL SEMI-AUTOMATIC TAPPERS, ½" to 2"
- HOT PRESSED NUT BURNING MACHINES
- 1½" CENTER FEED HOT PRESSED NUT MACHINE

Miscellaneous Forging, Bolt, Nut and Rivet Machinery.

DONAHEE STEEL PRODUCTS CO.
Forging Machinery Specialists
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For Sale at a Bargain:

- 1—No. 6-B Wilbraham-Greene Blower
 - 1—No. 8 8' Wilbraham-Greene Blower
 - 1—1½ Ton Gear Ladle
 - 1—2 Ton Gear Ladle
 - 1—4 Ton Gear Ladle
 - 1—No. 10 Cement Vertical Milling Machine
 - 3—Belt Driven Lathes
 - 1—100 Ton Fairbanks Track Scale
- Birdsboro Steel Foundry & Machine Company**
Birdsboro, Pa.

Ladles for Sale

1 each, 30 ton and 40 ton capacity, O. H. Steel Ladles with pouring rigging. Condition good. Price \$350.00 each, f.o.b. cars our works.

Address

West Leechburg Steel Company
P. O. Box 248, Pittsburgh, Pa.

Chattanooga Blast Furnace
2 Mesta blowing engines
11 water tube boilers
Electric plant
Pig iron breaker and crane
Skip hoist and skip cars
Three cinder pots
Steel cast house
Plant easily taken down for shipment.

W. W. TAYLOR
SIGNAL MTN., TENN.

We offer Rebuilt and fully guaranteed THOMPSON or TOLEDO SPOT and BUTT Welders, Hand Operated, Automatic or Power Driven. We have a complete line for immediate delivery at very low prices.

What are your requirements?

Taylor-Hall Welding Corporation
1 May St., Worcester, Mass.

Foundry Equipment

One 36" Newton Cupola. One 1-ton Tropenas Side-blown Converter. One No. 2 Root Positive Pressure Blower. One No. 3 Root Positive Pressure Blower. One No. 4 Root Positive Pressure Blower.

All above in good condition.

Inquire of or inspect at

Detroit Steel Casting Co.
Detroit, Mich.

Sand Blast Equipment

(Pangborn and Mott Make)

One 2 Room Unit—One 4 Room Unit. Complete with Tanks, Elevators, Storage Bins, Conveyors, Dust Arresters, Exhausters and Motors.

INGERSOLL-RAND AIR COMPRESSOR Imperial, Type 10 PV. Two stage, Compound Steam, Capacity 1260 cu. ft. per minute.

All above in first class condition and in operation at present. Will be sold at a very low price.

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Electric Welders

Send for big list of Welding Machines. All types.

Makes:—Lincoln, G. E., Wilson.

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126 Green St., Newark, N. J.

- 1—Rockwell Annealing and Tempering Furnace 18" x 36"
- 1—Rockwell Annealing and Tempering Furnace 18" x 42"
- 1—Rockwell Cyanide Furnace 24" x 24"
- 1—Rockwell Oil Tempering Furnace 18" x 24"
- 1—Rockwell High Speed Furnace—about 12" x 18"

All furnaces are oil fire—\$500.00 for the lot.

DAHLSTROM METALLIC DOOR CO.
Jamestown, N. Y.

BLOWING ENGINE

Nordberg, Duplex, cyls. 44 x 44 x 44, Corliss Inlet, Poppet Outlet Valves, 12400 cu. ft. p.m. 80 RPM. Rope or belt drive.

OVERHEAD CRANES

2—Morgan, 50 ft. span, 50 ton, main hoist, 15 ton on each auxiliary hoist, 30 ft. lift, 5 motor type, 3 ph. 60 cy. 440 volts.

MOTORS

- 5—75 HP G.E. Type I, Form M, 600 RPM.
 - 1—200 HP G.E. Type I, Form K, 600 RPM.
 - 2—225 HP G.E. Type I, Form K, 514 RPM.
 - 3—250 HP G.E. Type I, Form K, 514 RPM.
 - 2—400 HP G.E. Type I, Form P, 450 RPM.
 - 1—750 HP G.E. Type I, Form LM, 300 R.P.M.
- All 3 ph. 60 cy. 2200 volts.

Above equipment located at Kennett, Calif.

Hyman-Michaels Co.

Peoples Gas Building

Chicago, Ill.

UNITED COMMERCIAL COMPANY
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Immediate Shipment

60 H.P. St. Mary's Semi-Diesel Oil Engine, Horizontal. Complete with usual equipment.

64 H.P. Meitz Duplex Crude Oil Engine, self-contained on sub-base, complete with usual equipment.

Overhauled and guaranteed.

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Established 1900

STEAM ENGINE FOR SALE

Simple, non-condensing, slide valve, Wm. Tod Company Single Cylinder Steam Engine, Cylinder 28" Dia., 30" Stroke, 150 lbs. Steam Pressure; 96 R.P.M., Fly Wheel 194" Dia. In good condition. Price very low.

Address:

West Leechburg Steel Company
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Blowers Compressors Exhausters

Large Stock for all purposes, also Air Receivers, Tanks, Molding Machines and Foundry Equipment.

Pneumatic and General Machinery Dealers.

Send Specifications for your needs.

Clifton Pratt Co., 1224 W. 9th St., Cincinnati, Ohio

Two General Electric Centrifugal Single Stage

COMPRESSORS

Type "T," Capacity 1.5 lbs. and 2.5 lbs. at 3450 RPM with or without motors.

For complete specifications address

REMINGTON ARMS COMPANY, INC.
Purchasing Dept.
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BUHL AIR COMPRESSOR

on Channel Skids

DISPLACEMENT: 80 Cu. Ft. Free Air per minute. SPEED: 450 to 650 R. P. M. Speed controlled by positive gear driven, built-in centrifugal governor. PRESSURE: 100 lbs. per square inch. CYLINDER DIMENSIONS: 6½" diam. x 7" stroke—16 Horse Power.

Never used. Will sell low.

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Bury Compressor Co. 16x10x14, Class BBC Compressor, 500 cu. ft. capacity, belted to G.E., 75 H.P., 900 r.p.m., 220 or 440 volt, 60 cycle, 3 phase motor, complete, including belt, air receiver and unloader. Excellent condition. Bargain price.

V. M. NUSSBAUM & CO.
Fort Wayne, Ind.

AIR COMPRESSORS

1145 cu. ft. Chicago two stage type OCBE with motor.

599 cu. ft. Ingersoll-Rand two stage type XB-2 with motor.

DELTA EQUIPMENT CO.
148 N. Third St., Philadelphia, Pa.

BOILERS

2—150 H.P. 72" x 18' Ames Horizontal return tubular boilers ASME code, 150-lb. pressure. Each boiler contains 70 4" tubes, set in one battery, complete with header piping; practically new.

Very special offering for quick disposition.

The O'Brien Machinery Co.
113 North Third St., Philadelphia, Pa.
Long Distance Telephone: Market 0727
Cable Address: "OBRIEN" PHILADELPHIA.

Babcock — Boilers — Wilcox

Water Tube built for 180 lbs. pressure
(4) 400 H.P. (single settings) at \$2500.00 each
(2) 310 H.P. (battery setting) at \$2000.00 each
(2) 264 H.P. (battery setting) at \$1750.00 each
(4) 150 H.P. (battery setting) at \$1150.00 each

GREEN FUEL ECONOMIZERS

(1) Containing 5600 sq. ft. heating surface.
(1) Containing 4600 sq. ft. heating surface.
At 25% of present price.

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GENERATORS, A.C. and D.C.
MOTORS, A.C. and D.C.
WATER WHEELS—TRANSFORMERS
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LOCOMOTIVE CRANES
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1—Westinghouse 300 KW Rotary Converter, complete with transformers and switchboard. Voltage 250 on D.C. end, transforms from 480 to 187 volts. Replaced with larger unit. Machine in first class condition.

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Outside End Packed Pot Valve Type

2—10 x 6 x 10 Worthington
1—9 x 5 x 10 Worthington
1—10 x 4 x 10 Worthington
2—6 x 3 x 6 Wheeler
1—8 x 4 x 10 Warren

Motor Driven

4—1100 GPM 125' Head, 75 H.P. Motors
1—120 GPM 210' Head, 15 H.P. Motor
1—750 GPM 30' Head, 10 H.P. Motor
3—700 GPM 400' Head, 125 H.P. Motors
1—70 GPM 40' Head, 7½ H.P. Motor
1—150 GPM 62' Head, 5 H.P. Motor

MARVIN BRIGGS, INC.

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Underwriters Fire Pumps Guaranteed to Pass Inspection

18" x 10" x 12" Knowles duplex 1000 gallon Underwriters Fire Pump, slightly used, thoroughly overhauled and guaranteed. Four hose valves, all equipment.

16" x 9" x 12" Worthington duplex 750 gallon Underwriters Fire Pump, slightly used, thoroughly overhauled and guaranteed. Three hose valves and all equipment.

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Send for our monthly list of the largest stock in the United States of slightly used and thoroughly overhauled MACHINE TOOLS, POWER, ELECTRICAL AND CONTRACTOR'S EQUIPMENT.

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Jersey City, N. J.
Established 1900

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Watson-Stillman, 6" x 18", horizontal, three plunger, belt drive. Capacity 500 gals. per min., 500 pounds pressure. In excellent condition (at Waterbury, Conn.)

No. 5 Langelier Swaging or Pointing Machine. Capacity ¾", oil pump attached, belt drive, pilot wheel rack and pinion feed, assortment of dies for drifts or punches.

Lucas & Gliem 26" inserted tooth, Metal Cut Off Saw, friction feed, belt drive, extra cutter. In excellent condition.

These can be seen by appointment.

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**The RANDLE
MACHINERY CO.**

SINCE 1875
CINCINNATI, OHIO.
FOR BARGAINS IN RELIABLE
POWER PLANT EQUIPMENT
AND MACHINE TOOLS.

"Used Machinery Costs Less"

RANDLE

Priced to Sell Gas Engine Units

3—250 KVA. ALLIS-CHALMERS Generators, 2300 volt, 3 phase, 60 cycle, 200 r.p.m. direct connected to Allis-Chalmers Gas Engines, price each\$4,000.00

2—600 KVA. WESTINGHOUSE Generators, 600 volts, 3 phase, 60 cycle, 150 r.p.m. direct connected to WESTINGHOUSE Gas Engines, price each\$5,500.00

Complete with belted Exciters, Switchboards and all accessories. Units are in operating condition and are excellent values.

We will give purchaser terms if proper references are furnished.

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Electrical Equipment
Bought—Sold—Appraised

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Electric Generators

A. C. 480/240 Volt, 3 Phase, 60 Cycle

1—212 KVA Westing. late type, 600 RPM, 3 bearing with SK Exciter and S/B
1—180 KW Western Elec., 900 RPM
1—100 KVA Allis-Chalmers, 900 RPM
1—75 KW Gen. Elec. ATI, 900 RPM

D. C. 250 Volt

150 KW Western Elec. 3 bearing..... 520 RPM
125 KW Western Elec. ELC..... 650 RPM
100 KW Gen. Elec. RC-17..... 1200 RPM
100 KW Crocker-Wheeler CCD..... 650 RPM
80 KW Gen. Elec. D.C. 3 wire..... 1050 RPM
75 KW Sprague Elec. D..... 550 RPM
40 KW Westing. S..... 600 RPM
30 KW Gen. Elec. D.C. 3 wire..... 1300 RPM

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Large Stock of FULLY GUARANTEED
a.c. and d.c.



Motors—Generators—
Transformers and
Electrical Equipment

Belyea Company

Incorporated
147 West 18th St.,
New York City

USED GENERATOR SETS

350 K.W., 2 phase, 60 Cycle, 220 Volts, 150 R.P.M., General Electric Generator, direct connected to Rice & Sargent 16" x 30" x 32" Condensing Cross Compound Horizontal Engine.

250 K.W., 2 phase, 60 Cycle, 220 Volts, 150 R.P.M., General Electric Generator, direct connected to Rice & Sargent 18" x 32" Non-Condensing Horizontal Engine.

250 K.V.A., 2 phase, 60 Cycle, 240 Volts, 900 R.P.M., Westinghouse Generator, geared to Westinghouse Steam Turbine Non-Condensing, practically new.

All priced very low prior to removal from present location. Excellent proposition for dealers.

Henry A. Hitner's Sons Co.
4501 Richmond St., Philadelphia, Pa.

500 K.W. Rotary Converters

2—500 K.W. Allis-Chalmers 250 volts D.C. 2000 amps., 3 ph., 60 cy., 149 to 153 volts A.C., 720 R.P.M.

2—550 KVA. Allis-Chalmers, 3 phase, 60 cy. transformers, self cooled, 2300 volts primary down to rotary voltage.

A.C. and D.C. Panels, and also one D.C. Feeder Panel.

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Telephone Rector 4025-6-7.

Electric Generator

We have for sale 1 225 K.W. D.C. Generator, 250 Volts, 450 R.P.M. with pulley and Field Rheostat, Circuit Breaker and switch mounted on a Marble Panel. This machine is in A-1 condition. Its use being discontinued on account of the installation of a direct connected unit. Further information can be obtained from

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Bridgeport, Conn.

A. C. UNITS

375 KVA Gen. Elec., dir. con., 20 x 36 Nordberg Unaflo Engine.

100 KVA Burke, dir. con., 12 x 16 Erie Ball 4 Valve Engine.

A. C. Motors, all sizes.

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ELECTRICAL MACHINERY

Very large stock turbo generators, transformers, engine driven units, motor generators, motors, all descriptions.

George Sachsenmaier Co.

920 N. Third St., Philadelphia, Pa.

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DIRECT CONNECTED UNITS

- 2—25 K.W., Thompson-Ryan, 125 volt, 300 r.p.m., direct connected to McEwen 9 x 10 C.C. engine\$250 ea.
- 1—30 K.W., Westinghouse, 125 volt, 300 r.p.m., direct connected to Imperial engine.....\$500
- 1—100 K.W., Westinghouse, 250 volt, direct connected to a Ball & Wood engine.....\$600
- 1—125 K.W., Westinghouse, 125 volt, 100 r.p.m., direct connected to Watts-Campbell Corliss engine\$800
- 1—175 K.W., General Electric, 250 volt, 1200 r.p.m., direct connected to G. E. Synchronous motor, type A.T. I-6, 440 volt, H.P. output 365, 60 cycle, 1200 r.p.m.\$2500
- 1—300 K.W. Crocker-Wheeler, 125 volt, 100 r.p.m., direct connected to Watts-Campbell Corliss engine\$3000
- 3—75 K.W., General Electric, 250 volt, 2400 r.p.m., compound generators, direct connected to Curtis Two Stage turbines, 150 lbs. working pressure, non-condensing.....\$1000 ea.

Mallory Machinery Corporation
Baltimore, Md.



CRANES --- CRANES

WHAT ARE YOUR NEEDS?

Send Specification at once

GOOD VALUES QUICK RESULTS
ANY SIZE ANY TIME

See Page 96

LOCOMOTIVE CRANES

Almost new No. 4 BROWNHOIST No. 8934, 20 ton cap., 8 wheel MCB, 44'6" boom, ASME boiler Ohio-Mass. Standard, 2 cu. yd. cap. Clamshell Bucket. Excellent condition. Type "L" 40-ton cap. INDUSTRIAL, 8 wheel MCB, double drums, 59' split boom suitable taking inserts, new ASME boiler. Thoroughly reconditioned. Guaranteed.

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Overhead Traveling Cranes
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Foundry Equipment
In stock for prompt shipment
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Philadelphia, Pa.

Long Distance Telephone Locust 3577.

LOCOMOTIVE CRANE

35 Ton McMyler

Has New ASME Boiler. Boom 60' with 30' extension. Furnished with hook or bucket. Attractive Price. Immediate shipment.

L. A. Green Railway Equipment Co.
1st Nat'l Bank Bldg., Pittsburgh, Pa.

Electric Motor Clam Shell Bucket, 1½-yd., Hayward, with 10-hp. Motor, Controller, take up reel and cord.

Steel Bldg., 127' x 38' x 30', with 15-ton Traveling Crane.

Rotary Kilns, 109' x 7', complete, Chapman Gas Producer.

CENTRAL EQUIPMENT CO.

607 Owen Bldg., Detroit, Mich.

Two Good As New HAND CRANES

AT A BARGAIN
5 tons Capacity 36 ft. Span
50 ft. Runways

WHITE & BRO., INC.
Richmond & Hedley Sts., Phila., Pa.

FOR SALE

5 Tanks. Capacity 12,000 Gal.
First Class Condition. Formerly
Used for Gasoline. Inquire

NIAGARA IRON & METAL CO.
Box 553, Niagara Falls, N. Y.

Chain and Cable Slings

We offer subject to prior sale about 10 tons of Chain and Cable Slings, two and four hooks attached. Capacity from 5 to 25 tons. At 7c. per lb. for the chain. Cable slings, price on request.

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For Sale Cheap

25 Tons 1"x3/16" bands
18'-0" lg.

Victor Iron Supply Co., Inc.
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New Galvanized Wire Rope

500,000 ft. 13/16" Diameter 6 x 19 on original Reels

Relaying Rails

30-35-60-65-70 lb. section
Second Hand Pipe and Tanks, all sizes
THE PERRY BUXTON DOANE CO.
Boston, Mass.

STEEL SHEET — PILING

Rented, Sold, Bought, Driven and Pulled
Pile Hammers Rented.

WEMLINGER, INC.

149 Broadway, New York

3/8" Round Plain Reinforcing Bars

at 1½c. pound F.O.B. Philadelphia

ADDRESS BOX B-75

care The Iron Age, 230 W. 39th St., New York.

Surplus Stock—Bargain Price

- 60 lbs. new ASCE angle bars—594 pairs
- 80 lbs. new ASCE angle bars—191 pairs
- 85 lbs. new ASCE angle bars—441 pairs
- 100 lbs. new ASCE angle bars—669 pairs
- 12 lbs. new ASCE splice bars—3676 pairs
- 60 lbs. Relaying angle bars—800 pairs
- 50 lbs. Relaying angle bars—135 pairs
- 80 lbs. Relaying angle bars—35 pairs
- 85 lbs. Relaying angle bars—250 pairs
- 100 lbs. Relaying angle bars—218 pairs
- 35 G. T. new 70 lbs. ASCE Rail and Angle Bars
- 85 lbs. New ASCE Tie Plates—4525
- 90 lbs. New ASCE Tie Plates—2049
- 100 lbs. New ASCE Tie Plates—1502

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P. O. Box 74 Chester, Pa.

If a company in your
line has found a better
way of doing a thing,
the probabilities are
that your business
paper tells about it.

To keep abreast of the
times, read your busi-
ness paper carefully
each week.

CONTRACT WORK

**SPECIAL MACHINERY, MACHINE WORK.
PRESS WORK, FOUNDRY WORK, AUTOMATIC SCREW MACHINE WORK**

Rates—One Inch Space \$4.00 Per Insertion on Yearly Basis
Rates for Other Spaces Furnished on Request.

Get It Out of the Way

That machinery you are no longer operating—that surplus material which you will probably never use. Why continue to store it?

Why not get it out of the way and off the inventory? You can get cash for it by listing it in the Clearing House Section of The Iron Age.

Quality HAMMERED STEEL FORGINGS

Axles, Billets, Cranks, Crusher Shafts,
Discs, Grinding Balls, Liner Plates,
Shafting, Shoes and Dies for Stamp
Mills and Forgings for Ore Mines.

MIDWEST FORGE & STEEL CO.
P. O. Box 430, East St. Louis, Illinois

WOOD and METAL PATTERNS of every description

The Cleveland Castings Pattern Co.
1930 East 61st St., Cleveland, Ohio

HOT DIP GALVANIZING

We have the largest hot dip galvanizing plant and kettles in the United States. We have the most modern equipment to do first class galvanizing at lowest prices. Prime Western Zinc Used Exclusively. Galvanized products furnished.

Send Us Your Inquiries.

Joseph P. Cattie & Brothers
Gaul and Letterly Streets
Philadelphia

CATTIE BROTHERS CORPORATION

Philadelphia Galvanizing and
Tinning Works
Galvanized Angles, Cut to Length and Punched
Carried in Stock:
Galvanized Bars, Channels, Ovals, Half Ovals
Bolts, Spikes and Other Materials.
Tioga, Sepviva and Witte Sts.,
Philadelphia, Pa.

GALVANIZING Sherardizing

Exceptional Facilities for Hot Dipping
Members Up to 45 Ft.
Carload Lots or Less

STEEL TOWERS FABRICATING

Write for Prices

**International Derrick
& Equipment Co.**
COLUMBUS, OHIO

BATES GALVANIZING

Hot dip process—Automatic heat regulated kettles—Thirty-seven foot vats—Prime Western spelter—Excellent railroad connections—SRR-VICE. Request our booklet.

B E S T
Bates Expanded Steel Truss Co.
East Chicago, Indiana

BUSINESS OPPORTUNITIES

Factory Sites and Fac-
tories for Sale—Agencies
Wanted — Miscellaneous
Advertisements

RATES PRICE PER INSERTION

	1 Time	2 Times	3 Times	4 Times
1 inch	\$5.75	\$5.25	\$5.25	\$4.75
2 inches	10.50	9.50	8.50	8.75
3 inches	15.75	14.25	13.13	13.13
4 inches	19.00	17.50	17.50	16.50
6 inches	35.00	33.00	33.00	32.00

Rates for other
spaces furnished on
request.

ROLLING MILL FOR SALE

All of the Real Estate, Buildings and Machinery belonging to the former Hoosier Rolling Mill Company, now Mid-States Steel and Iron Corporation, located at Terre Haute, Indiana, will be sold at private sale, as a whole or in various parcels by the Receivers and the Security Trust Company, Trustee, at the office of the Citizens Trust Company, at Terre Haute, Indiana, at 10 o'clock A. M., July 26, 1926.

Interested parties are invited to view the properties or write for further information to the under-
signed:

CITIZENS TRUST CO.
FRANK J. WOLFE

Co-Receivers
Terre Haute, Indiana

OR

SECURITY TRUST COMPANY
Trustee for Bondholders,
Indianapolis, Indiana.

SPECIALISTS IN FACTORIES FOR SALE OR LEASE

Have professional engineers with considerable plant experience and who can therefore better appreciate your requirements, aid you in locating a suitable factory.

TECHNICAL SERVICE COMPANY
Woolworth Bldg., N. Y. C. Whitehall 8412

FOUNDRY FOR SALE OR LEASE

In Jersey City, 125 ft. frontage by 100 deep. Partially equipped. An unusual proposition for the right parties. Railroad facilities. Within 5 minutes' drive of new traffic tube connecting New York and New Jersey. Property unencumbered. Principals only.

ADDRESS BOX Z-854

care The Iron Age, 239 W. 39th St., New York.

FOR SALE

Modern, fireproof foundry and machine shop and equipment, 175,000 sq. ft., near Chicago, excellent labor market, at one half replacement value. Available at once.

ADDRESS BOX 128-D

care The Iron Age, 1507 Otis Bldg., Chicago, Ill.

FOR SALE

Foundry and Machine Shop. Buildings about 100x140. Lot 120x148.50. On paved street, with water, sewer, electric light and power. Sidetrack. Price \$26,000.00. Liberal Terms.

THE HINKLEY COMPANY
5308 Greenfield Ave.,
West Allis, Wisconsin

STRUCTURAL STEEL FABRICATING PLANT

(With Ornamental Department)

Annual Business \$225,000

Purchase Price \$75,000

Showing unusually good profit now and always has. Enjoys excellent reputation among contractors and architects. Price includes \$60,000 worth of structural steel stock; balance in machinery, etc. Purchase of buildings and property optional. Located in ideal New England city. Owner's health reason for selling.

ADDRESS BOX B-53

care The Iron Age, 239 W. 39th St., New York.

A Splendid Opportunity

A long established manufacturer of Material Handling Machinery, desiring to retire, offers for sale—Plant, Water Power, Equipment and Good Will. The output of the company has always been of the best and has a most excellent standing among its customers. For full particulars

ADDRESS A. J., BOX Z-947

care The Iron Age, 239 W. 39th St., New York.

FOR SALE

Two Factory Buildings in Canada, located at Sherbrooke, Que. One of the finest manufacturing centers in Canada. 30,000 square feet floor space, buildings sprinkled throughout.

Full description on request.

The E. A. Eddy Machinery Co., Inc.
211 Eddy St., Providence, R. I.

An Opportunity to Buy a Portable Electric Tool Business

From a company who manufacture a more complete line of Portable Electric Drills, Grinders, etc., etc., than any other concern in that line.

ADDRESS P. O. BOX 586
Cincinnati, Ohio

FOR SALE

Controlling Interest in Plate Fabricating Shop near New York City.

ADDRESS BOX Z-900

care The Iron Age, 239 W. 39th St., New York.

WATERFRONT PLANT

In heart of central Atlantic Seaboard manufacturing district. 18 acres ground 70,000' of buildings; waterfront on channel 33' deep; boilers; engines; cranes; 3 railroad spurs.

TECHNICAL SERVICE CO.

Woolworth Bldg., New York, N. Y.

FOR SALE OR LEASE COMPLETE MFG. PLANT

Centrally located in low cost labor area. Modern one-story brick bldg.; 42,000 sq. ft. with switch. Large inventory of machinery including 25 Punch Presses, 20 Automatic Screw Machines, 16 Lathes, 3 Shapers, 8 Milling Machines, Grinding Equipment, Furnaces, Shears, Motors and misc. eqpt. Appraised \$280,000. Will lease for only \$1,900 month or sell at attractive price. Need a factory building? Write us your requirements. FANTUS FACTORY LOCATING SERVICE, 1325 South Oakley Ave., Chicago.

Use the
Business
Opportunities
Section to

Buy or sell factories,
foundries, machine
shops, or other busi-
nesses in the fields we
cover;

Rent or lease manu-
facturing or ware-
house space;

Secure or establish
sales agencies of all
kinds;

Buy or sell industrial
sites, establish manu-
facturing connections;

Announce Board of
Trade and Chamber
of Commerce induce-
ments to new indus-
tries;

Obtain capital, part-
ners, etc.;

Secure or dispose of
patents;

Announce auctions or
receivers' sales, open-
ing of bids, etc.

BUSINESS OPPORTUNITIES

Factory Sites and Fac-
tories for Sale—Agencies
Wanted — Miscellaneous
Advertisements

RATES PRICE PER INSERTION

	1 Time	2 Times	3 Times	4 Times
1 inch	\$5.75	\$5.25	\$5.25	\$4.75
2 inches	10.50	9.50	9.50	8.75
3 inches	15.75	14.25	13.13	13.13
4 inches	19.00	17.50	17.50	16.50
5 inches	25.00	23.00	23.00	22.00

Rates for other
spaces furnished on
request.

THE CHANCES ARE

that someone would
like to have those ma-
chines which you have
replaced.

Why not list them in
the Clearing House
Section of The Iron
Age?

Manufacturers are con-
stantly watching this
section for bargains in
used machinery. Why
not tell them what you
have?

OUR CLIENT

who owns and operates two metal working plants, one in Chicago district and one in Florida, seeks individual or group of men experienced in structural steel work to invest \$50,000 and upward in growing business. Net operating profits first four months 1926 were over \$18,000.00. Both plants are being successfully operated.

For a personal interview in our New York Office, latter part of June, address IRL ROSE, 226 West 47th Street, New York City.

SUPERINTENDENT

who can get business for our up-to-date Gray Iron Jobbing Foundry of 3 to 5 tons daily capacity; must understand the business fully; make a moderate investment; handle own money; open shop. Two hours' ride from New York City on main line railroad. Excellent opportunity for a live wire.

ADDRESS BOX B-85
care The Iron Age, 239 W. 39th St., New York.

Chicago Engineering Company, experienced in theoretical and practical modern machine shop and foundry methods, with sales office and warehouse, is interested in representing one or two lines of machine tools, machinery or high class mechanical specialties.

ADDRESS BOX 7167-A
care The Iron Age, 1507 Otis Bldg., Chicago, Ill.

WANTED

Sales Agency on commission basis for line of high grade Lift Trucks and Portable Cranes by long established and well-known sales organization specializing in material handling equipment in New York and New Jersey. Intensive representation guaranteed. Best business and bank references.

ADDRESS BOX B-51
care The Iron Age, 239 W. 39th St., New York.

ARE YOU LOOKING FOR A FIRM TO MANUFACTURE YOUR MACHINE OR METAL PRODUCT?

A well established and thoroughly responsible company, located in Rochester, N. Y., and engaged in the manufacturing of medium and light machinery and stamped metal products, wishes to add to its line. Metal articles or small machines already on the market preferred, but will consider manufacturing and perhaps marketing any metal article or small machine either on royalty or outright purchase which appeals to it as having sufficient merit.

ADDRESS BOX Z-74
care The Iron Age, 239 W. 39th St., New York.

We Desire Correspondence

with principals who have machinery manufacturing business needing a modern machine shop for its production, or a used machinery business requiring warehouse and shop for rebuilding. Location Central Pennsylvania. Might assist in additional financing if required.

ADDRESS BOX Z-951
care The Iron Age, 239 W. 39th St., New York.

A FIRM OF MANUFACTURERS' AGENTS IN NEW YORK, WITH SPLENDIDLY EQUIPPED OFFICES, NOW REPRESENTING IN THE EAST THREE MANUFACTURERS OF MECHANICAL EQUIPMENT, IS IN POSITION TO EFFECTIVELY HANDLE ANOTHER ACCOUNT UPON A STRICTLY COMMISSION BASIS. WOULD BE PLEASED TO HEAR FROM ANY MANUFACTURER INTERESTED.

ADDRESS BOX B-7
care The Iron Age, 239 W. 39th St., New York.

WHAT IS YOUR YEARLY FREIGHT CHARGE LOSS?

Do you ever get a return on overcharges on freight bills? Seldom without our service, unless the bill is obviously wrong.

We take your paid freight bills, determine the correct classification, rate and extension. We collect all overcharges for you and return your freight bills in good condition. We do the work without inconvenience or annoyance to you. Expense of service paid entirely from collections. It will pay you to investigate this service.

Traffic Service Bureau
Commonwealth Trust Bldg.
HARRISBURG PA.

Sales Service—High Grade

Responsible Manufacturers' Agent of experience and ability, wants one or two more sound lines to handle in Cleveland district on commission basis. Equipped to put very high class sales effort on attractive line of factory equipment, material, stampings, forgings, etc.

ADDRESS BOX C-904
care The Iron Age, 1362 Hanna Bldg., Cleveland, Ohio.

FACTORY EXECUTIVE

Age 30 and of very wide experience. Seeks permanent connection with adequately financed company. Experience includes mechanical designing, steam power, shop practice, piece and bonus systems, shop superintendence, buying, accounting, advertising and very largely selling of technical products. Education mechanical, electrical and radio, with a smattering of metallurgy. Most recently head of own corporation and at present employed in position which has no outlet for my varied experience. Army aviation officer during War. Believe myself best fitted for assistant to general manager. Address Box B-86, care The Iron Age, 239 W. 39th St., New York.

PATENTS

Expert on metal products and metallurgical patents. Examiner U. S. Patent Office for 16 years.

JOHN BOYLE, Jr.—Patents
201 Ouray Building Washington, D. C.

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D.C., June 18, 1926. SEALED PROPOSALS will be opened in this office at 3 P. M., July 9, 1926, for remodeling and enlarging the United States Post Office, Middletown, N. Y. Drawings and specifications may be obtained from the Custodian of Building or at this office in the discretion of the Supervising Architect. Jas. A. Wetmore, Acting Supervising Architect.

THE WEEKLY MEETING PLACE of EMPLOYER AND EMPLOYEE

HELP WANTED

WANTED—A man thoroughly experienced in the polishing and buffing industry to fill a position as sales engineer with a large manufacturer of polishing and buffing wheels and other polishing room equipment. The man wanted is one who has been through the mill of practical experience, and his experience must be broad enough to enable him to sell our equipment, particularly our polishing wheels, by actually demonstrating their merits in the plants of prospective users. To such a man, who is capable of producing results, we offer a permanent position with unlimited possibilities for progress. In making application write us fully giving us a complete outline of your experience and qualifications. Communications will be held strictly confidential. Address Box Z-980, care *The Iron Age*, 239 W. 39th St., New York.

WELL established Pacific Coast shop has opening for thoroughly qualified **MECHANICAL SUPERINTENDENT**; duties at present would include foundry, pattern and machine shops doing general jobbing work and employing upwards of two hundred men. Position could be made to include other departments later. Write fully, giving age, education, past and present employers and salary wanted. Address Box B-62, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—EXECUTIVE, capable of supervising two hundred employees; must be thoroughly experienced in buffing, polishing, nickel plating, japanning, lacquering, and as a matter of fact anything pertaining to metal finishing. A man who has had some years of practical experience, with a thorough understanding of chemistry, preferred. Must be able to furnish best of references. Address Box Z-912, care *The Iron Age*, 239 W. 39th St., New York.

GRAY IRON FOUNDRY SUPERINTENDENT—Experienced in every phase of jobbing foundry practice. Knowledge of latest machine molding methods required. Must have experience on all kinds of castings up to 15 tons a piece. Able to handle foundry of 40 tons daily pouring capacity. Address Box B-87, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—By old California firm, **SALES ENGINEER** for passenger and freight elevators. Write full particulars as to age, education, experience, married or single, present connection, salary wanted and when ready to work. Address Box B-61, care *The Iron Age*, 239 W. 39th St., New York.

SALES ENGINEER WANTED—Experienced in Impregnating and Drying Apparatus; Splendid opportunity with a well established firm for the right man. Give full particulars, experience, etc. Address Box B-56, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—GENERAL MANAGER for Steel Plate Fabricating Shop. Capacity 75 men. Located within 75 miles of New York and Philadelphia. Give full experience with reply. Address Box B-69, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—Two first-class **MACHINE DESIGNERS**. State salary expected. Only first-class, experienced men considered. Salary to correspond to ability. Apply only in writing. **REED-PRENTICE COMPANY**, 677 Cambridge St., Worcester, Mass.

WANTED—TOOL STEEL SALESMAN. Must be thoroughly experienced for warehouse handling well known grade. Salary, expenses and bonus. Address Box B-39, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—ENGINEER capable of designing dies and thoroughly familiar with automotive metal stampings. Factory located in Pennsylvania. Address Box B-81, care of *The Iron Age*, 239 W. 39th St., New York.

WANTED—EXPERIENCED YOUNG SALESMAN, builders' hardware, for Orient. Address Box B-65, care *The Iron Age*, 239 W. 39th St., New York.

HELP WANTED

SALES ENGINEERS

Calling on Power Plants, etc., to sell a fuel and oil saver that also increases capacity, by far the best; big men can earn big money.

ADDRESS BOX Z-942
care *The Iron Age*, 239 W. 39th St., New York.

WANTED—EXECUTIVE, thoroughly experienced in the Cutting and Drawing Lubricant Industry to fill a position as Sales-Manager and Assistant to President of a large Cutting and Drawing Lubricant Manufacturing Co. in the Middle West. The man wanted is one that has been through the mill of practical experience, and his experience must be broad enough to enable him to direct salesmen and also personally demonstrate our products in the plants of prospective users. To such a man who is capable of producing results we offer a permanent position with unlimited possibilities for progress. When making application write us fully, giving a complete outline of your experience and capabilities. All communications will be held strictly confidential. Address Box B-59, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—By Old Established Shop in Southern California **SALES ENGINEER** for riveted steel and welded pipe department. Must be capable man. Write fully, giving age, detail of education and experience, salary wanted and when available. Address Box B-63, care *The Iron Age*, 239 W. 39th St., New York.

EMPLOYMENT SERVICE

SALARIED POSITIONS

\$2,500 to \$25,000

If you are qualified for position between \$2,500 and \$25,000, and are receptive to negotiations for new connection, your response to this announcement is invited. The undersigned provides a thoroughly organized service, established sixteen years ago, to conduct confidential preliminaries, and assist the qualified man in locating the particular position he desires. Not an employment agency. Retaining fee protected by refund provision, as stipulated in our agreement. Send name and address only for description of service. **R. W. Bixby, Inc., 274 Main St., Buffalo, N. Y.**

SITUATIONS WANTED

MANUFACTURING EXECUTIVE—Practical mechanical engineer with a thorough knowledge of design, machine and tool practice, the buying of all kinds of materials, with the best system of efficiency, planning, routing and cost with a thorough understanding of labor, of handling men—a man of keen executive and organizing ability, capable of throwing immediate speed and accuracy into production to make things pay. Available on short notice. Location immaterial; salary \$4,800. Address Box B-79, care *The Iron Age*, 239 W. 39th St., New York.

SALES OR MFG. EXECUTIVE—Capable executive, age 42, with a thorough knowledge of modern business and finance, backed by broad sales, manufacturing and engineering experience in the Pressed Steel, Automotive and R. R. Industries, desires connection offering large scope (Branch Manager or Representative included). Amount of salary at start unimportant compared to opportunity to prove value to a business of assured permanence. Best references. Box 281, care *The Iron Age*, 1402 Widener Bldg., Philadelphia, Pa.

SITUATIONS WANTED

I have had ten years' experience with a **NEW ENGLAND JOBBING STEEL FOUNDRY**, the last five of which have been of an executive nature, in close touch with production, costs, finances, accounting, and maintaining service to customers. Would now like to change for position with larger opportunities, where above training would be a mutual help. Address Box B-83, care *The Iron Age*, 239 W. 39th St., New York.

DETROIT SALESMAN—Ten years' successful experience selling there. Graduate engineer, practical mechanic, reliable and responsible. Seeks good account machine tools, shop equipment or small tools on commission basis. Address Box Z-994, care *The Iron Age*, 239 W. 39th St., New York.

PURCHASING AGENT—Seven years' experience as Purchasing Agent for large Safe and Metal Furniture Plant desires to make change. Would consider position as Assistant with large concern. Familiar with all phases of buying and stores work. Knows how to work and willing to work hard. Available on short notice. Address Box B-30, care *The Iron Age*, 239 W. 39th St., New York.

SALES ENGINEER—Age 39. 12 years' experience with one firm; sales and promotion work on Atlantic Coast among Industrial plants. Past four years selling steel products on the Pacific Coast. Would like to make connection with reputable firm. Good personality, successful sales record. Best reference from past and present employer. Address Box B-38, care *The Iron Age*, 239 W. 39th St., New York.

DEVELOPMENT ENGINEER—Record of achievement in developing new lines of Pressed Steel and Sheet Metal Products. Experienced as works manager, sales manager and general manager; successfully gives proper background and viewpoint for such work. Age 39; write for interview, principals only, please. Address Box Z-997, care *The Iron Age*, 239 W. 39th St., New York.

PURCHASING EXECUTIVE with eleven years' experience with large manufacturing corporations. Have organized and supervised purchasing, stores, perpetual inventory, cost, inspection, receiving and shipping departments. Also practical shop experience. Desire position where ambition and creative ability will be appreciated. Address Box B-28, care *The Iron Age*, 239 W. 39th St., New York.

PURCHASING AND PRODUCTION—A man who can keep purchases properly balanced with production schedules is available. Twelve years purchasing for electrical manufacturing plus six years assistant to production manager. Can read blue prints; familiar with shop methods and engineering requirements. Address Box B-72, care *The Iron Age*, 239 W. 39th St., New York.

Position as **SUPERINTENDENT** or **FOREMAN of FORGE SHOP** by a practical, experienced forger, covering every job from laborer to superintendent, also experienced in heat treating. Interview desired. Address Box Z-906, care *The Iron Age*, 239 W. 39th St., New York.

COST EXPERT, competent to establish daily labor and material cost in large machine factory, open for engagement. Can install new or improve existing system. Moderate salary, best reference. Address Box B-74, care *The Iron Age*, 239 W. 39th St., New York.

Get more use out of your floor space by selling used machinery and equipment you don't need, through the Clearing House Section.

THE WEEKLY MEETING PLACE of EMPLOYER AND EMPLOYEE

SITUATIONS WANTED

EXECUTIVE ENGINEER for LARGE MANUFACTURING PLANTS

MECHANICAL and ELECTRICAL ENGINEER with 20 years' experience directing the design, construction and operation of manufacturing plants. Am an able executive with a fine personality.

ADDRESS BOX B-45
care *The Iron Age*, 239 W. 39th St., New York.

GENERAL SUPERINTENDENT and SALES MANAGER of large pressed steel, machine and plate fabricating plant, with exceptional broad experience covering production, designs, cost, buying and sales; with proven ability in organizing and directing men and affairs. Loyal, energetic and resourceful. Desires position as general superintendent or manager. Will consider small company if I have an opportunity of earning a stock bonus and become financially interested. Age 36. Married. Graduate engineer. **Address Box B-22, care *The Iron Age*, 239 W. 39th St., New York.**

METAL PRODUCTS and MACHINERY MANUFACTURERS. Twenty years' broad and successful experience in various metal manufacturing lines; production manager, chief engineer, industrial engineer, general superintendent; well versed in modern production methods, up to date costs, piecework, designing and plant method; highest references. Available on short notice, location immaterial. **Address Box B-54, care *The Iron Age*, 239 W. 39th St., New York.**

MECHANICAL ENGINEER, 29, energetic and sincere, thoroughly versed in modern drafting room and machine shop practice, safety work, with broad experience in maintenance engineering, designing, checking and supervising construction of process machinery, steel mill equipment, etc., is looking forward to bigger responsibilities. **Address Box C-864, care *The Iron Age*, 1362 Hanna Bldg., Cleveland, Ohio.**

STRUCTURAL STEEL FOREMAN or SUPERINTENDENT. Age 37, at present employed in this capacity, but desires larger opportunities, 20 years' experience in various lines of steel work. Economical producer, possessing good judgment, energy and tact. **Address Box B-82, care *The Iron Age*, 239 W. 39th St., New York.**

WORKS ACCOUNTANT and EXECUTIVE SECRETARY. Eighteen years' experience on pay rolls, stores, costs, purchasing, claims, employment, housing, safety and welfare work, workmen's compensation and group insurance. **Address Box B-4, care *The Iron Age*, 239 W. 39th St., New York.**

SALES MANAGER—Pressed Steel and Sheet Metal Products, at present and for last 3½ years in charge of sales and advertising with twenty-two salesmen and sales offices in principal cities. Successful in direct mail campaigns and in securing large contracts. Age 38. **Address Box Z-998, care *The Iron Age*, 239 W. 39th St., New York.**

PURCHASING AGENT with 13 years' record of successful buying for large machinery factory open for engagement. Moderate salary, best references. **Address Box B-73, care *The Iron Age*, 239 W. 39th St., New York.**

SITUATIONS WANTED

Foundry Superintendent

Wishes to make change to locate in or around New York. Thoroughly capable man who can handle men. Best of references from present employer.

ADDRESS BOX B-9
care *The Iron Age*, 239 W. 39th St., New York.

WORKS MANAGER—Experienced installing general and cost accounting systems, statistician and assistant to president of large manufacturing company, becoming familiar with the higher executive duties of general management, was given stock and made a director and assistant secretary. Now employed as general superintendent of open hearth furnaces, blooming, bar and strip mills which under my supervision have increased production thirty per cent with twenty per cent less men. **Address Box B-21, care *The Iron Age*, 239 W. 39th St., New York.**

GENERAL MANAGER—Twenty years' experience manufacturing and marketing almost everything in Sheet Steel. Consistently successful record embracing every position from apprentice to general manager, medium sized and large corporations. Last four years Vice-President and General Manager, but now desiring change. Age 39. **Address Box Z-999, care *The Iron Age*, 239 W. 39th St., New York.**

ENGINEER, 25 years' experience and successful record, design, construction and maintenance of industrial plants, machine and tool design, development of products and processes, production, manufacturing, foundry and machine shop operations, power plant design and operation, can handle men and obtain results. **Address Box B-78, care *The Iron Age*, 239 W. 39th St., New York.**

EXECUTIVE—SUPERINTENDENT or similar position, experienced in general shop practice and manufacturing on production basis on medium and heavy machinery, large machine tools, reciprocating and centrifugal pumps. Initiative with good technical education. **Address Box Z-939, care *The Iron Age*, 239 W. 39th St., New York.**

MECHANICAL ENGINEER, (A.M.I. Mech. Eng.) American citizen. Extensive experience here and abroad. Commercial training; all round export knowledge and executive ability, desires appointment as manufacturers' representative Philadelphia and district. **Address Box B-34, care *The Iron Age*, 239 W. 39th St., New York.**

EMPLOYMENT MANAGER or ASSISTANT SUPERINTENDENT—Now employed, desires change. Age 36, Mechanical Engineer, experienced in Industrial Safety Work and Accident and Compensation cases. **Address Box B-15, care *The Iron Age*, 239 W. 39th St., New York.**

SITUATIONS WANTED

Successful Manager

Manager, Industrial Engineer, Organizer with exceptional record in engineering industries wants position as General Manager. Graduate engineer, modern business training, broad practical experience. Forty years of age. Member A.S.M.E. High Grade Executive.

ADDRESS BOX B-58
Care *The Iron Age*, 239 W. 39th St., New York.

COMPTROLLER varied experience, including organization and executive duties of general management, installation of general and cost accounting, bonus and piece work systems, estimating, purchasing, scheduling, purchases and production. Four years' experience general superintendent plant employing six hundred men, increasing production, reducing cost. **Address Box B-50, care *The Iron Age*, 239 W. 39th St., New York.**

EXECUTIVE

MECHANICAL ENGINEER, 25 YEARS' EXPERIENCE IN MANUFACTURING OFFICE AND SHOP. HANDLING MEN, CO-ORDINATING DEPARTMENTS. NOW EMPLOYED. ADDRESS BOX B-66, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

MANUFACTURERS' AGENT WANTS LINES KINDRED TO METAL TRADES. INDIANA AND OHIO. TEN YEARS' EXPERIENCE IN TERRITORY. ADDRESS BOX B-71, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

FACTORY EXECUTIVE, 25 years' all around experience, metal parts, novelties, instruments, machinery, tools, cost system, results from help, desires position. **Address Box B-29, care *The Iron Age*, 239 W. 39th St., New York.**

MAN WITH EXTENSIVE AMERICAN and European iron and steel experience open consider position. Especially conversant raw materials and all export and domestic markets. **Address Box B-42, care *The Iron Age*, 239 W. 39th St., New York.**

STRUCTURAL SHOP SUPERINTENDENT or ASSISTANT for shop of 1500 to 2000 tons per month. 25 years' experience in this line. Can furnish best of reference. Available July 1. **Address Box B-70, care *The Iron Age*, 239 W. 39th St., New York.**

WORKS MANAGER, Technical Graduate, thorough shop and drafting training. Experienced as executive in production, design, costs, purchasing maintenance, plant layout and organization. **Address Box B-55, care *The Iron Age*, 239 W. 39th St., New York.**

EXPERIENCED IRON and STEEL ROLLER in guide and hand rounds, shapes, bands and deformed bars. Desires a steady position. Good organizer, best reference. **Address Box B-77, care *The Iron Age*, 239 W. 39th St., New York.**

EXPERIENCED KILN and FURNACE BUILDER for the Ceramic, Enameling, Glass, Iron and Steel industries, wants a position. **Address Box B-84, care *The Iron Age*, 239 W. 39th St., New York.**

Help Wanted Rates

Set solid, minimum 50 words.....\$3.00
Each additional word 6c
All capitals, minimum 50 words.....\$4.50
Each additional word 9c
All capitals, leaded, minimum 50 words...\$6.00
Each additional word 12c

Situations Wanted Rates

Set solid, minimum 25 words.....\$.75
Each additional word 3c
All capitals, minimum 25 words.....\$1.50
Each additional word 6c
All capitals, leaded, minimum 25 words...\$2.25
Each additional word 9c

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BUYERS INDEX

The firms listed here are also represented with an advertisement in this issue. See the advertisements for further information.

ABRASIVE WHEELS—See Grinding Wheels

ACCUMULATORS—Hydraulic

Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.
Lake Erie Engineering Corp., Buffalo, N. Y.
Southwark Fdry. & Mach. Co., Phila., Pa.
Watson-Stilman Co., 75 West St., N. Y. C.
Wood, R. D., & Co., Philadelphia, Pa.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

ACETYLENE—Dissolved in Cylinders

Air Reduction Sales Co., 342 Madison Ave., New York City.
International Oxygen Co., Newark, N. J.

ACIDS—Pickling

American Chemical Paint Co., Ambler, Pa.

AIR TANKS AND CYLINDERS

Air-Tight Steel Tank Co., Pittsburgh, Pa.
Janney-Steinmetz & Co., Phila., Pa.
Scaife, William B., & Sons Co., Pitts., Pa.

ALLOYS—Aluminum Silicon

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

ALLOYS—Chromium Tungsten

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

ALLOYS—Copper Silicon

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

ALLOYS—Manganese Copper

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

ALLOYS—Titanium

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

ALLOYS—Vanadium

Vanadium Corp. of America, 120 B'way, N. Y. C.

ALLOYS—Zirconium

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

ALUMINUM

Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.

ANGLES, BEAMS, CHANNELS AND TEES

Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
De Cou, Richard, Company, Philadelphia, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Company, Chicago, Ill.
Phoenix Iron Co., Philadelphia, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

ANTI-FRICTION METALS—See Babbitt Metal and Bearing Metal

ANVILS

Potts, Horace T., & Co., Philadelphia, Pa.

ARBORS

Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARMORING MACHINES—Wire and Cable

Sleeper & Hartley, Inc., Worcester, Mass.

ARMORING SURFACE—For Concrete

Irving Iron Works Co., Long Island City, N. Y.

ARRESTERS—Spark

Harrington & King Perforating Co., Chicago.

AXLES—Car or Locomotive

Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.

BABBITT METAL

General Die Casting Co., Reading, Pa.
Magnolia Metal Co., 113 Bank St., N. Y. C.
Michigan Smelting & Refining Co., Detroit, Mich.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BAKELITE—Laminated

National Vulcanized Fibre Co., Wilmington, Del.

BAKELITE—(Molded)

Colt's Patent Fire Arms Mfg. Co., Hartford, Ct.

BALL FLOATS

Naugatuck Mfg. Co., Naugatuck, Conn.

BALLS—Burnishing

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.

BALLS—Forged Chrome Steel for Pulverizing

Chrome Steel Wks., Carteret, N. J.
Philadelphia Steel & Iron Co., Phila., Pa.

BALLS—Steel, Brass or Bronze

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Auburn Ball Bearing Co., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Ct.
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.

BANDS—Steel

Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Co., The, Massillon, O.
Geneva Metal Wheel Co., 145 Railroad St., Geneva, O.
Sharon Steel Hoop Co., Sharon, Pa.

BARGES—Steel

American Bridge Co., 71 Broadway, N. Y. C.

THIS index is a comprehensive guide to sources of supply.

Each company listed is represented with an advertisement for your use in obtaining information.

Use the list and consult the advertisements.

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BARRELS—Burnishing

Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Mach. & Stpg. Co., Cleveland, O.

BARRELS—Steel Shop

Cleveland Wire Spring Co., Cleveland, O.

BARRELS—TUMBLING—See Tumbling Barrels

BARS—Alloy

Central Steel Company, The, Massillon, O.
United Alloy Steel Corp., Canton, O.

BARS—Concrete, Reinforcing

Bethlehem Steel Company, Bethlehem, Pa.
Gulf States Steel Co., St. Louis, Mo.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Truscon Steel Co., Youngstown, Ohio.

BARS—Iron and Steel

Ames, W. & Co., Jersey City, N. J.
Bethlehem Steel Company, Bethlehem, Pa.
Buffalo Bolt Company, N. Tonawanda, N. Y.
Carnegie Steel Co., Pittsburgh, Pa.
Columbia Steel Corp., San Francisco, Cal.
De Cou, Richard, Company, Philadelphia, Pa.
Illinois Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Pacific Coast Steel Co., San Francisco, Cal.

Philadelphia Steel & Iron Co., Phila., Pa.
Potts, Horace T., & Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.
Victor Iron Supply Co., 1743 Carter Ave., New York City.

BARS—Manganese Steel

Manganese Steel Forge Co., Philadelphia, Pa.

BEAMS—See Angles, Beams, Channels and Tees

BEARING METAL

Bunting Brass & Bronze Co., Toledo, Ohio.
Fredericksen Company, Saginaw, Mich.
Magnolia Metal Co., 113 Bank St., N. Y. C.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS—Babbitt

Bunting Brass & Bronze Co., Toledo, Ohio.
Franklin Die-Casting Corp., Syracuse, N. Y.

BEARINGS—Ball

Aetna Ball Bearing Mfg. Co., Chicago, Ill.
American Roller Bearing Co., Pittsburgh, Pa.
Auburn Ball Bearing Co., Rochester, N. Y.
Bantam Ball Bearing Co., Bantam, Conn.
Bearings Co. of America, The, Lancaster, Pa.
Fafnir Bearing Company, New Britain, Ct.
Hyatt Roller Bearing Co., Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Standard Machinery Co., Auburn, R. I.
Torrington Co., Torrington, Conn.

BEARINGS—Brass and Bronze

Bunting Brass & Bronze Co., Toledo, Ohio.
Columbia Mich. Wks. & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Fredericksen Company, Saginaw, Mich.
Lumen Bearing Co., Buffalo, N. Y.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS—Oilless

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Roller

American Roller Bearing Co., Pittsburgh, Pa.
Bantam Ball Bearing Co., Bantam, Conn.
Bock Bearing Co., Toledo, O.
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Newark, N. J.
Standard Machinery Co., Auburn, R. I.
Timken Roller Bearing Co., Canton, Ohio.

BEARINGS—Roller Tapered

Bantam Ball Bearing Co., Bantam, Conn.
Bock Bearing Co., Toledo, O.
Timken Roller Bearing Co., Canton, O.

BEARINGS—Shaft Hanger

Fafnir Bearing Company, New Britain, Ct.

BEARINGS—Thrust

Aetna Ball Bearing Mfg. Co., Chicago, Ill.
Bantam Ball Bearing Co., Bantam, Conn.
Bearings Co. of America, The, Lancaster, Pa.
Bock Bearing Co., Toledo, O.
Fafnir Bearing Co., New Britain, Ct.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Standard Mchry. Co., Auburn, R. I.
Timken Roller Bearing Co., Canton, Ohio.

BELT DRESSING

Graton & Knight Mfg. Co., Worcester, Mass.

BELTING—Chain

Morse Chain Co., Ithaca, N. Y.

BELTING—Leather

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.
Ullman, Jacob, Buffalo, N. Y.

BELTING—Leather Link

Graton & Knight Mfg. Co., Worcester, Mass.

BELTING—Rubber

New York Belting & Packing Co., 91-93 Chambers St., New York City.
Robins Conveying Belt Co., Passaic, N. J.

BENCHES—Draw—See Wire Drawing Machinery

BENDING MACHINES—Angle or Eye

Thomas Spacing Mch. Co., Pittsburgh, Pa.

BENDING MACHINES—Hand and Power

Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Dreir & Krump Mfg. Co., Chicago, Ill.
Kane & Rosch, Syracuse, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BILLETS—Forging

Andrews Steel Co., Newport, Ky.
Central Steel Company, The, Massillon, O.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BILLETS—Nickel Steel

Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Company, The, Massillon, O.

BILLETS—Re-rolling

Andrews Steel Co., Newport, Ky.

BILLETS—Steel

American Tube & Stpg. Co., Bridgeport, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Central Steel Co., The, Massillon, O.
Columbia Steel Co., Pittsburgh, Pa.
Tenn. Coal, Iron & R. R. Co., Birmingham, Ala.
United Alloy Steel Corp., Canton, O.
Wood, Alan, Iron & Steel Co., Phila., Pa.

BLANKS—Chisel

Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Steel Tool Co., Cleveland, Ohio.

BLANKS—Gear and Pinion

Akron-Selle Co., Akron, Ohio.
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
National Forge & Tool Co., Irvine, Pa.

BLOCKS—Chain

Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Ford Chain Block Co., Philadelphia, Pa.
Wright Mfg. Co., Lisbon, O.

BLOWERS—Centrifugal

General Electric Co., Schenectady, N. Y.
Sterling Blower Co., Hartford, Conn.

BLOWERS—Pressure

Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Spencer Turbine Co., Hartford, Ct.

BLOWERS—Rotary

Connersville Blower Co., Connersville, Ind.
Roots, F. H., & F. M., Co., Connersville, Ind.

BLUE PRINT MACHINES

Wickes Brothers, Saginaw, Mich.

BOILER HEADS—Flanged and Dished

Bethlehem Steel Co., Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BOILER SHELLS—Riveted or Welded

Scalfe, Wm. B., & Sons Co., Pittsburgh, Pa.

BOILERS—Return Tubular

Sotter Bros., Inc., Pottstown, Pa.

BOILERS—Second-hand

Harris Bros. Co., Chicago, Ill.
Hooper-Momberger Co., 90 West St., N. Y. C.
Randle Machinery Co., Cincinnati, O.

BOILERS—Waste Heat

Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Edge Moor Iron Company, Edge Moor, Del.
Wickes Boiler Co., Saginaw, Mich.

BOILERS—Water Tube

Abendroth & Root Mfg. Co., Newburgh, N. Y.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Edge Moor Iron Company, Edge Moor, Del.
Tudor Boiler Mfg. Co., Cincinnati, O.
Wickes Boiler Co., Saginaw, Mich.

BOLT AND NUT MACHINERY

Acme Machinery Co., Cleveland, O.
Landis Machine Co., Inc., Waynesboro, Pa.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Machinery Co., Tiffin, O.
Pawtucket Mfg. Co., Pawtucket, R. I.
Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.
Williams Tool Corporation, Erie, Pa.

BOLT AND RIVET CLIPPERS

Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Porter, H. K., Inc., Everett, Mass.

BOLTS—Expansion

Brohard Co., Philadelphia, Pa.

BOLTS—Eye

Oliver Iron & Steel Corp., Pittsburgh, Pa.

BOLTS—Special

Buffalo Bolt Company, N. Tonawanda, N. Y.
Pawtucket Mfg. Co., Pawtucket, R. I.

BOLTS AND NUTS—Brass and Bronze

Everitt Co., The, Boston, Mass.

BOLTS AND NUTS—Iron and Steel

American Screw Co., Providence, R. I.
Ames, W., & Co., Jersey City, N. J.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Company, N. Tonawanda, N. Y.
Clark Bros. Bolt Co., Milldale, Ct.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Merrill Bros., Maspeth, N. Y.
Pawtucket Mfg. Co., Pawtucket, R. I.
Reed & Prince Mfg. Co., Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.

Rockford Bolt Co., Rockford, Ill.
Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BORING, DRILLING AND MILLING MACHINES—Horizontal

Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Lucas Machine Tool Co., Cleveland, O.
McCabe, J. J., Lathe & Machry, Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BORING, DRILLING AND MILLING MACHINES—Vertical

Baker Bros., Inc., Toledo, O.
Bullard Machine Tool Co., Bridgeport, Ct.
Prentiss, Henry, & Co., Inc., 149 B'way, N. Y. C.

BORING BARS

Bullard Machine Tool Co., Bridgeport, Conn.

BORING MACHINES—Car Wheel

Niles-Bement-Pond Co., 111 B'way, N. Y. C.

BORING MACHINES—Cylinder

Baker Bros., Inc., Toledo, O.

BORING MACHINES—Vertical

Bullard Machine Tool Co., Bridgeport, Ct.
Cincinnati Planer Co., The, Cincinnati, O.
Consolidated Mach. Tool Corp. of America, Wilmington, Del.
Gisholt Machine Company, Madison, Wis.
McCabe, J. J., Lathe & Machry, Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

BOX STRAPPING AND FASTENERS

De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.

BOXES—Annealing

Mesta Machine Co., Pittsburgh, Pa.
Union Steel Casting Co., Pittsburgh, Pa.

BOXES—Steel

Cleveland Wire Spring Co., Cleveland, O.
Sterling Wheelbarrow Co., Milwaukee, Wis.

BRAKES—Electric

Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

BRAKES—Metal Forming

Cincinnati Shaper Co., The, Cincinnati, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Ct.
Robinson, J. M., Mfg. Co., Cincinnati, Ohio.
Streine Tool & Mfg. Co., The, New Bremen, O.

BREECHINGS

Lancaster Iron Works, Inc., Lancaster, Pa.

BRICK—Chrome

General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.

BRICK—Fire

Ashland Fire Brick Company, Ashland, Ky.
Crescent Refractories Co., Corwensville, Pa.
General Refractories Co., Philadelphia, Pa.
Ironton Fire Brick Company, Ironton, O.
Pillbrico Jointless Firebrick Co., Chicago, Ill.
Queens Run Refractories Co., Inc., Lock Haven, Pa.
St. Louis Vitified & Fire Brick Co., St. Louis, Mo.
Stow-Fuller Refractories Co., The, Clero, O.
Taylor, Chas., Sons Co., Cincinnati, Ohio.
U. S. Refractories Corp., Mount Union, Pa.
Valentine, M. D., & Bro. Co., Woodbridge, N. J.
Walsh Fire Clay Prod. Co., St. Louis, Mo.

BRICK—Fire Clay

General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Taylor, Chas., Sons Co., Cincinnati, O.
Valentine, M. D., & Bro. Co., Woodbridge, N. J.

BRICK—Insulating

Celite Prod. Co., 11 B'way, N. Y. C.

BRICK—Magnesite

General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.

BRICK—Silica

General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.
U. S. Refractories Corp., Mount Union, Pa.

BRIDGE BUILDERS

American Bridge Co., 71 Broadway, N. Y. C.
McClintic-Marshall Company, Pittsburgh, Pa.
Phoenix Iron Company, Philadelphia, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Virginia Bridge & Iron Co., Roanoke, Va.

BRIDGE OPERATING MACHINERY—Movable

Earle Gear & Mch. Co., Philadelphia, Pa.

BROACHES

American Broach & Mch. Co., Ann Arbor, Mich.
Lapointe, J. N., Co., New London, Conn.
Lapointe Mch. Tool Co., Hudson, Mass.

BROACHING MACHINES

American Broach & Mch. Co., Ann Arbor, Mich.
Chambersburg Engrg. Co., Chambersburg, Pa.
Lapointe, J. N., Co., New London, Conn.
Lapointe Mch. Tool Co., Hudson, Mass.
Oilgear Co., The, 659 Park St., Milwaukee, Wis.

Pawtucket Mfg. Co., Pawtucket, R. I.

BROUCHING MACHINES—Hydraulic

American Broach & Mch. Co., Ann Arbor, Mich.

BRONZE—Phosphor

Bridgeport Brass Co., Bridgeport, Conn.
Michigan Smelting & Refining Co., Detroit, Mich.
Phosphor Bronze Smelting Co., Phila., Pa.

BUCKETS—Clamshell

Blaw-Knox Co., Pittsburgh, Pa.
Erie Steel Construction Co., Erie, Pa.
Hais, Geo., Mfg. Co., Inc., The, 142nd St. & Canal Pl., New York City.
Hayward Co., The, 50 Church St., N. Y. C.
Owen Bucke Co., Cleveland, O.
Williams, G. H., Co., Erie, Pa.

BUCKETS—Electric Motor

Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Elevator

Hendrick Mfg. Co., Carbondale, Pa.

BUCKETS—Grab

Brosius, Edgar E., Pittsburgh, Pa.
Brown Hoisting Machry. Co., Cleveland, O.
Browning Crane Co., The, Cleveland, O.
Erie Steel Construction Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Orton Crane & Shovel Co., Chicago, Ill.
Williams, G. H., Co., Erie, Pa.

BUCKETS—Orange Peel

Hayward Co., The, 50 Church St., N. Y. C.
Orton Crane & Shovel Co., Chicago, Ill.

BUCKLES—Bale, Tie

Joliet Wrought Washer Company, Joliet, Ill.

BUFFING AND POLISHING WHEELS

Divine Brothers Co., Utica, N. Y.

BUILDINGS—Factory

Austin Co., The, Cleveland, Ohio.
Eddy, E. A., Mehry, Co., The, Providence, R. I.
Fantus Factory Locating Service Co., Chicago, Ill.
Ferguson, H. K., Company, Cleveland, O.
Lane, H. M., Co., Detroit, Mich.
Technical Service Co., Woolworth Bldg., N.Y.C.

BUILDINGS—Steel

American Bridge Co., 71 Broadway, N. Y. C.
Austin Co., The, Cleveland, Ohio.
Beimont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Inc., Berlin, Ot.
Blaw-Knox Co., Pittsburgh, Pa.
De Cou, Richard, Company, Philadelphia, Pa.
Ferguson, H. K., Company, Cleveland, O.
McClintic-Marshall Co., Pittsburgh, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Truscon Steel Co., Youngstown, O.

BULLDOZERS

Beatty Machine & Mfg. Co., Hammond, Ind.
Williams, White & Co., Moline, Ill.

BUNKERS—Coal

Lancaster Iron Works, Inc., Lancaster, Pa.

BURNERS—Combination Oil and Gas

Anthony Co., The, Long Island City, N. Y.
Surface Combustion Co., 366-368 Gerard Ave., Bronx, N. Y.

BURNERS—Enclosed Flame Gas

Oven Equipment & Mfg. Co., New Haven, Ct.

BURNERS—Oil

Anthony Co., The, Long Island City, N. Y.
Best, W. N., Corp., 11 Broadway, N. Y. C.
Economy Furnace Co., The, Chicopee, Mass.
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N.Y.

BURRS—Steel

Wrought Washer Mfg. Co., Milwaukee, Wis.

BUSHINGS—Brass and Bronze

Bunting Brass & Bronze Co., Toledo, O.

BUSHINGS—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila., Pa.

CABLE—Electric

General Electric Co., Schenectady, N. Y.

CABLEWAYS AND TRAMWAYS—See Tramways**CALORIMETERS—Coal or Gas Recording**

Smith Gas Engineering Co., Dayton, O.

CARBIDE

Air Reduction Sales Co., 342 Madison Ave., New York City.

CARBONIZING—See Heat Treating**CAR DUMPERS**

Wellman-Seaver-Morgan Co., Cleveland, O.

CARS—Dump

Atlas Car & Mfg. Co., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

CARS—Industrial and Mining

Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Easton Car & Construction Co., Easton, Pa.

BUYERS INDEX

CARS—Railroad (Second-hand)

Hyman-Michaels Co., Chicago, Ill.

CASE HARDENING AND TEMPERING COMPOUNDS

Anti-Borax Compound Co., Ft. Wayne, Ind.

CASTINGS—Abrasive ResistingChrome Steel Works, Carteret, N. J.
Era Steel Co., Bucyrus, Ohio.**CASTINGS—Acid or Heat Resisting**

Hoskins Mfg. Co., Detroit, Mich.

CASTINGS—Alloy SteelChicago Steel Fdry. Co., Chicago, Ill.
Era Steel Co., Bucyrus, Ohio.**CASTINGS—Brass, Bronze or Aluminum**Aluminum & Brass Co., Lockport, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Buffalo Bronze Die Cast Corp., Buffalo, N. Y.
Caldwell, E. R., & Son, Brass Co., 620 W. Fayette St., Syracuse, N. Y.
Columbia Mch. Wks. & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Cross Engineering Co., Carbondale, Pa.
Douglas & Lomason Co., Detroit, Mich.
Enterprise Brass Works, Muskegon Heights, Mich.
Franklin Die-Casting Corp., Syracuse, N. Y.
Lumen Bearing Co., Buffalo, N. Y.
Marf Machine & Die Casting Co., 20 Bush Terminal, Brooklyn, N. Y.
Metal & Alloy Specialties Co., Inc., Buffalo, N. Y.
Mt. Vernon Die Casting Corp., Mt. Vernon, N. Y.
Phosphor Bronze Smelting Co., Phila., Pa.
Portland Co., The, Portland, Me.
Sherwood Mfg. Co., Buffalo, N. Y.
Shoop Bronze Co., Tarentum, Pa.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Sterling Die Casting Co., Inc., 741 39th St., Brooklyn, N. Y.**CASTINGS—Crucible Steel**

Dycast Steel Co., Collinsville, Ct.

CASTINGS—DieDycast Steel Co., Collinsville, Ct.
Franklin Die-Casting Corp., Syracuse, N. Y.
General Die Casting Co., Reading, Pa.
Marf Machine & Die Casting Co., 20 Bush Terminal, Brooklyn, N. Y.
Michigan Smelting & Refining Co., Detroit, Mich.
Mt. Vernon Die Casting Corp., Mt. Vernon, N. Y.
Soss Mfg. Co., Grand Ave. & Bergen St., Brooklyn, N. Y.
Sterling Die Casting Co., Inc., 741 39th St., Brooklyn, N. Y.
Stewart Die Casting Corp., Chicago, Ill.**CASTINGS—Electric Steel**Acme Steel & Malleable Iron Works, Inc., Buffalo, N. Y.
American Steel Foundries, Chicago, Ill.
Belle City Malleable Iron Co., Racine, Wis.
Chicago Steel Fdry. Co., Chicago, Ill.
Crucible Steel Casting Co., Cleveland, O.
Industrial Steel Casting Co., The, Toledo, O.
Maynard Electric Steel Casting Co., Milwaukee, Wis.
Monroe Steel Castings Co., Monroe, Mich.
Nugent Steel Castings Co., Chicago, Ill.
Smith, Geo. H., Steel Casting Co., Milwaukee.
Treadwell Engineering Co., Easton, Pa.**CASTINGS—Gray Iron**American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Connecticut Foundry Co., The, Rocky Hill, Conn.
Fairmount Foundry, Inc., Philadelphia, Pa.
Frederick Iron & Steel Co., Frederick, Md.
Glens Falls Mach. Works, Glens Falls, N. Y.
Gray Iron Foundry Co., Reading, Pa.
Hay Foundry & Iron Works, Newark, N. J.
Hershey Mch. & Fdry. Co., Manheim, Pa.
Hyde Park Fdry. & Mch. Co., Hyde Park, Pa.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Kline Hardware Co., Allentown, Pa.
Mackintosh-Hemphill Company, Pittsburgh, Pa.
Newark Malleable Iron Works, Louis Sacks, Inc., Newark, N. J.
North Wales Mach. Co., Inc., North Wales, Pa.
Osborn Mch. Co., Du Bois, Pa.
Patch, F. R., Manufacturing Co., Rutland, Vt.
Penn Fdry. & Mfg. Co., Box 182, Reading, Pa.
Pennsylvania Engrg. Works, New Castle, Pa.
Sessions Foundry Company, The, Bristol, Ct.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Standard Engineering Co., Ellwood City, Pa.
Stuart & Peterson Co., The, Burlington, N. J.
Sweet & Doyle Fdry. & Mch. Co., Troy, (Green Island), N. Y.
Swett, A. L., Iron Wks., 139 Glenwood Ave., Medina, N. Y.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Toledo Mch. & Tool Co., Toledo, O.
Turner & Seymour Mfg. Co., Torrington, Ct.
Union Mfg. Co., New Britain, Ct.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Virginia Foundry Co., Virginia, Minn.
Walworth Run Foundry Co., Cleveland, O.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.**CASTINGS—Malleable**Acme Steel & Malleable Iron Works, Inc., Buffalo, N. Y.
Belle City Malleable Iron Co., Racine, Wis.
Berryhill Malleable Iron Co., Evansville, Ind.
Cadillac Malleable Iron Co., Cadillac, Mich.
Canton Malleable Iron Co., Canton, Ohio.Danville Malleable Iron Co., Danville, Ill.
Eberhard Mfg. Co., Cleveland, Ohio.
Flagg, Stanley G., & Co., Inc., Phila., Pa.
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Haven Malleable Castings Co., The, Cincinnati, Ohio.
Lakeside Malleable Castings Co., Racine, Wis.
Link-Belt Co., 200 So. Belmont St., Indianapolis, Ind.
Malleable Iron Fittings Co., Branford, Ct.
Marion Malleable Iron Works, Marion, Ind.
Meeker Foundry Company, Newark, N. J.
Newark Malleable Iron Works, Louis Sacks, Inc., Newark, N. J.
Northern Malleable Iron Co., St. Paul, Minn.
Peoria Malleable Castings Co., Peoria, Ill.
Richmond Malleable Casting Co., Richmond, Ind.
Temple Malleable Iron & Steel Co., Phila., Pa.
Vermilion Malleable Iron Co., Hoopeston, Ill.**CASTINGS—Manganese Steel**

Era Steel Co., Bucyrus, Ohio.

CASTINGS—Open Hearth Steel

Commercial Steel Casting Co., Marion, O.

CASTINGS—Semi-SteelChambersburg Engrg. Co., Chambersburg, Pa.
Malleable Iron Fittings Co., Branford, Ct.**CASTINGS—Stainless Steel**

Firth, Thos., & Sons, Inc., Hartford, Ct.

CASTINGS—SteelAdamson Mach. Co., The, Akron, O.
Allegheny Steel Co., Brackenridge, Pa.
American Steel Foundries, Chicago, Ill.
Atlantic Steel Castings Co., Chester, Pa.
Atlas Steel Casting Co., Buffalo, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Chicago Steel Foundry Co., Chicago, Ill.
Chrome Steel Wks., Carteret, N. J.
Cincinnati Steel Castings Co., Cincinnati, O.
Commercial Steel Casting Co., Marion, O.
Crucible Steel Casting Co., Cleveland, O.
Crucible Steel Casting Co., Lansdowne, Pa.
Dycast Steel Co., Collinsville, Conn.
Era Steel Co., Bucyrus, Ohio.
Federal Steel Fdry. Co., Chester, Pa.
Industrial Steel Casting Co., The, Toledo, O.
Malleable Iron Fittings Co., Branford, Ct.
Maynard Electric Steel Castings Co., Milwaukee, Wis.
Mesta Machine Co., Pittsburgh, Pa.
Nugent Steel Castings Co., Chicago, Ill.
Philadelphia Roll & Mach. Co., Phila., Pa.
Reading Steel Casting Co., Inc., Reading, Pa.
Sharon Foundry Co., Sharon, Pa.
Smith, Geo. H., Steel Casting Co., Milwaukee, Wis.
Strong Steel Fdry. Co., Buffalo, N. Y.
Temple Malleable Iron & Steel Co., Phila., Pa.
Union Steel Casting Co., Pittsburgh, Pa.
Wharton, William, Jr., & Co., Inc., Easton, Pa.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.**CEMENT—Fire Resisting**

Harbison-Walker Refractories Co., Pittsburgh, Pa.

CEMENT—Leather Belting

Graton & Knight Mfg. Co., Worcester, Mass.

CEMENT—Quick Setting, Acid Proof and Insulator

Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.

CEMENT—Silica and ChromeGeneral Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.**CEMENT ROOFING TILE**American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.**CENTERING MACHINES**Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Whitton, D. E., Mach. Co., New London, Ct.**CENTERS—Index**

Simmons Mach. Tool Corp., Albany, N. Y.

CHAIN MACHINERY

Vaughn Machinery Co., Cuyahoga Falls, O.

CHAINS—Cable

Morton, Thomas, 245 Centre St., N. Y. C.

CHAINS—CoilAmerican Chain Company, Inc., Bridgeport, Ct.
Bradlee & Co., Philadelphia, Pa.
Carr Chainworks, Inc., Troy, N. Y.**CHAINS—Conveyor**Brown Hoisting Machinery Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.**CHAINS—Crane and Hoist**Bradlee & Co., Philadelphia, Pa.
Carr Chainworks, Inc., Troy, N. Y.**CHAINS—Dredge**American Chain Company, Inc., Bridgeport, Ct.
Carr Chainworks, Inc., Troy, N. Y.**CHAINS—Power Transmission**American High Speed Chain Co., Indianapolis, Ind.
Howe Chain Co., Muskegon, Mich.
Link-Belt Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.
Webster Mfg. Co., Chicago, Ill.**CHAINS—Rocker-Joint**

Morse Chain Co., Ithaca, N. Y.

CHAINS—Sash

Morton, Thos., 245 Centre St., N. Y. C.

CHAINS—Sprocket WheelAmerican High Speed Chain Co., Indianapolis, Ind.
Culman Wheel Co., Chicago, Ill.
Union Chain & Mfg. Co., Sandusky, O.
Webster Mfg. Co., Chicago, Ill.
Whitney Mfg. Co., Hartford, Ct.**CHANNELS—See Angles, Beams, Channels and Tees****CHAPLETS**

Erdle Perforating Co., Rochester, N. Y.

CHASERS

Jones & Lamson Mach. Co., Springfield, Vt.

CHECKS—Metal

Schwerdtle Stamp Co., Bridgeport, Ct.

CHIMNEYS—Steel

Lancaster Iron Works, Inc., Lancaster, Pa.

CHROMIUM METAL

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

CHUCKING MACHINES—Automatic

Baird Mach. Co., Bridgeport, Ct.

CHUCKING MACHINES—Multiple Spindle

National Acme Co., Cleveland, Ohio.

CHUCKS—DrillCleveland Twist Drill Co., Cleveland, O.
McCroskey Tool Corp., Meadville, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Union Mfg. Co., New Britain, Ct.**CHUCKS—Lathe**Hoggson & Pettis Mfg. Co., New Haven, Conn.
Union Mfg. Co., New Britain, Conn.
Whitton, D. E., Mch. Co., New London, Conn.**CHUCKS—Magnetic**

Heald Mch. Co., Worcester, Mass.

CLAMPS

Byerson, Jos. T., & Son, Inc., Chicago, Ill.

CLEANER—MetalAmerican Chemical Paint Co., Ambler, Pa.
Ford, J. B., Co., Wyandotte, Mich.
Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.
Oakley Chemical Co., 22 Thames St., N. Y. C.**CLEANING MATERIALS**American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Co., Wyandotte, Mich.
Oakley Chemical Co., 22 Thames St., N. Y. C.**CLEANING MATERIALS—Glass**Ever-Glow Co., Cleveland, Ohio.
Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.
Skybrite Co., The, Cleveland, Ohio.**CLEANING STARS**

Canton Malleable Iron Co., Canton, Ohio.

CLOTHING—Asbestos and Fireproof

Safety Equip. Service Co., Cleveland, O.

CLUTCHES—FrictionBrown Engineering Co., Reading, Pa.
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 6th St., Cincinnati, O.
Falls Clutch & Mchry Co., Cuyahoga Falls, O.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Moore & White Co., Philadelphia, Pa.
Schultz, A. L., & Son, Chicago, Ill.**COAL**Cleveland-Cliffs Iron Co., Cleveland, Ohio.
North American Coal Corp., The, Cleveland, Ohio.
Pilling & Co., Inc., Philadelphia, Pa.
Pittsburgh Coal Co., Pittsburgh, Pa.
Snyder, W. P., & Co., Pittsburgh, Pa.**COAL, ORE AND ASH HANDLING MACHINERY**Alliance Machine Co., Alliance, O.
Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machry Co., Cleveland, O.
Hayward Co., The, 50 Church St., N. Y. C.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Orton Crane & Shovel Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.**COILING MACHINES—Flexible Shaft, Metallic Tube and Casing**

Sleeper & Hartley, Inc., Worcester, Mass.

COILS—Pipe

Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

COKE—MetallurgicalBethlehem Steel Company, Bethlehem, Pa.
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Hillman Coal & Coke Co., Pittsburgh, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.

Snyder, W. P. & Co., Pittsburgh, Pa.
Stewart Furnace Co., The, Cleveland, O.
Tutein, E. Arthur, Inc., Boston, Mass.
Waldo, Egbert, & McClain, Inc., Buffalo, N.Y.
Walter-Wallingford & Co., Cincinnati, O.

COKE-OVEN MACHINERY
Alliance Machine Co., Alliance, O.
Atlas Car & Mfg. Co., Cleveland, O.

COKE OVENS—By-Products
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.

COLD DRAWING MACHINES—Bar & Wire
Standard Engineering Co., Ellwood City, Pa.
Vaughn Mchry. Co., Cuyahoga Falls, O.

COLLARS—Spacing for Milling Cutters
Detroit Stamping Co., Detroit, Mich.

COMPRESSORS—Air
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Air Compressor Wks., 558 Hamilton Ave., Brooklyn, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
De Laval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Spencer Turbine Co., Hartford, Ct.
Sullivan Mchry. Co., Chicago, Ill.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

COMPRESSORS—Gas
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 B'way, N. Y. C.

CONCRETE CONSTRUCTION
Austin Co., The, Cleveland, Ohio.
Ferguson, H. K., Company, Cleveland, O.

CONCRETE CRIBBING—Precast
R. C. Products Co., Cleveland, Ohio.

CONCRETE MACHINERY
Ideal Concrete Mchry. Co., Cincinnati, O.
Knickerbocker Co., Jackson, Mich.

CONCRETE REINFORCEMENT
American Steel & Wire Co., Chicago, Ill.

CONCRETE ROOFING TILE
American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.

CONCRETE UNITS—Miscellaneous
R. C. Products Co., Cleveland, Ohio.

CONDENSERS
Dean Bros. Co., Indianapolis, Ind.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.

CONDUITS—Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

CONNECTING RODS
Leard, Wm., Co., Inc., New Brighton, Pa.

CONTRACTORS—General
Austin Co., The, Cleveland, Ohio.

CONTRACTORS' SUPPLIES—Second-hand
Albert & Davidson Pipe Corp., 256-264 Oakland St., Brooklyn, N. Y.

CONTROLLERS—Crane
Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

CONTROLLERS—Electric
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Electric Motor
Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

CONTROLLERS—Temperature
Bristol Co., Waterbury, Ct.
Wilson-Maclean Co., Inc., 738 E. 143rd St., New York City.

CONVEYING AND ELEVATING MACHINERY
Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.
Portable Machinery Co., Passaic, N. J.
Robbins Conveying Belt Co., Passaic, N. J.

CONVEYORS—Portable
Haisa, Geo., Mfg. Co., Inc., The, 142d St., & Canal Pl., N. Y. C.
Portable Machinery Co., Passaic, N. J.

COOLING DEVICES—Furnace
Blaw-Knox Co., Pittsburgh, Pa.

COPING MACHINES
Cleveland Punch & Shear Wks. Co., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

CORE BREAKERS—Pneumatic
Sullivan Mchry. Co., Chicago, Ill.

CORNICE BRAKES
Dreis & Krump Mfg. Co., Chicago, Ill.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., Pontiac, Mich.

COUNTERBORES
Cleveland Twist Drill Co., Cleveland, O.
Gairing Tool Co., Inc., The, Detroit, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTING MACHINES
Durant Manufacturing Co., Milwaukee, Wis.
Hart, R. E., Mfg. Co., Battle Creek, Mich.
Hoot, Co., Bristol, Conn.
Veeder Mfg. Co., Hartford, Ct.

COUPLINGS—Air Hose
Cleveland Pneumatic Tool Co., The, Cleve., O.

COUPLINGS—Cut-off, Friction
Johnson, Carlyle, Mach. Co., Manchester, Ct.
Moore & White Co., Philadelphia, Pa.

COUPLINGS—Flexible Shaft
Brown Engineering Co., Reading, Pa.
Clark Controller Co., The, Cleveland, O.
Electric Controller & Mfg. Co., Cleveland, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Thompson Brothers, Philadelphia, Pa.

COUPLINGS—Friction Clutch
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 6th St., Cincinnati, O.
Falls Clutch & Mchry. Co., Cuyahoga Falls, O.
Johnson, Carlyle, Mach. Co., Manchester, Ct.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

COUPLINGS—Pipe
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

COUPLINGS—Shaft
Falls Clutch & Mchry. Co., Cuyahoga Falls, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.

CRANES—Crawling Tractor
Browning Crane Co., The, Cleveland, O.
Harnischfeger Corp., Milwaukee, Wis.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.

CRANES—Electric Traveling
Alliance Machine Co., Alliance, O.
Bedford Foundry & Machine Co., Bedford, Ind.
Box, Alfred, & Co., Inc., Philadelphia, Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, Ohio.
Harnischfeger Corp., Milwaukee, Wis.
Maris Brothers, Inc., Philadelphia, Pa.
Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 Broadway, N.Y.C.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Payne, N. B., & Co., 25 Church St., N. Y. C.
Roeper Crane & Hoist Works, Inc., Reading, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Crane Co., The, Bucyrus, O.

CRANES—Gantry
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

CRANES—Hand Power
Alliance Machine Co., Alliance, O.
Armington Engineering Co., Euclid, O.
Bedford Foundry & Machine Co., Bedford, Ind.
Box, Alfred, & Co., Inc., Philadelphia, Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Maris Brothers, Inc., Philadelphia, Pa.
Payne, N. B., & Co., 25 Church St., N. Y. C.
Toledo Crane Co., The, Bucyrus, O.
Wright Mfg. Co., Lisbon, O.

CRANES—Jib
Box, Alfred, & Co., Inc., Philadelphia, Pa.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

CRANES—Locomotive
Brown Hoisting Machinery Co., Cleveland, O.
Browning Crane Co., The, Cleveland, O.
Harnischfeger Corp., Milwaukee, Wis.
Industrial Works, Bay City, Mich.
King, Philip T., 50 Church St., N. Y. C.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, O.
Orton Crane & Shovel Co., Chicago, Ill.

CRANES—Motor Truck
Browning Crane Co., The, Cleveland, O.

CRANES—Portable
Beatty Machine & Mfg. Co., Hammond, Ind.
Canton Fdry. & Mch. Co., Canton, Ohio.

CRANES—Portable Electric
Elwell-Parker Electric Co., Cleveland, O.

CRANK SHAFTS
Landis Tool Co., Waynesboro, Pa.
Leard, Wm., Co., Inc., New Brighton, Pa.
Union Switch & Signal Co., Swissvale, Pa.

CRIBBING—Concrete
R. C. Products Co., Cleveland, Ohio.

CRIMPING MACHINES
Streine Tool & Mfg. Co., The, New Bremen, O.

CRUCIBLES—Metallurgical
McCullough-Daisell Crucible Co., Pitts., Pa.
Ross Tacony Crucible Co., Philadelphia, Pa.

CRUCIBLES—Platinum
Baker & Co., Inc., Newark, N. J.

CRUSHERS—Steel Turning
American Crusher & Machinery Corp., 1440 Broadway, New York City.
American Pulverizer Co., St. Louis, Mo.

CRUSHERS—Stone
Morgan Engineering Co., Alliance, O.

CUPOLAS—Foundry
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Paxson, J. W., Co., Philadelphia, Pa.

CUTTERS—Bolt
Acme Machinery Co., Cleveland, O.
Landis Mach. Co., Inc., Waynesboro, Pa.
National Machinery Co., Tiffin, O.

CUTTERS—Gear
O. K. Tool Co., Inc., The, Shelton, Conn.

CUTTERS—Key Seating
Davis Keyseater Company, Rochester, N. Y.
Whitney Mfg. Co., Hartford, Ct.

CUTTERS—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., Cleveland, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
O. K. Tool Co., Inc., The, Shelton, Conn.
Union Twist Drill Co., Athol, Mass.

CUTTING COMPOUNDS
Oakley Chemical Co., 22 Thames St., N. Y. C.

CUTTING-OFF MACHINES—Pipe
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Etna Machine Co., The, Toledo, O.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene

CYLINDERS—Compressed Air, Gas, etc.
National Tube Co., Pittsburgh, Pa.

CYLINDERS—Seamless
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
National Tube Co., Pittsburgh, Pa.

DERRICKS
American Terry Derrick Co., South Kearny, N. J.
Mallory Machinery Corp., Baltimore, Md.

DIAMOND TOOLS
Diamond-Stephan Mfg. Co., Urbana, O.
Dickinson, Thos. L., 34 Gold St., N. Y. C.

DIAMONDS—Carbon and Bortz (Importers)
Diamond-Stephan Mfg. Co., Urbana, O.

DIE BLOCKS
Bethlehem Steel Company, Bethlehem, Pa.
Heppenstall Forge & Knife Co., Pitts., Pa.
McWilliams, John, & Sons, Jersey City, N. J.
Wetherell Bros. Co., Cambridge, 30, Mass.

DIE-CASTING MACHINE
Lynd-Farquhar Co., Boston, Mass.

DIE SETS
U. S. Tool Co., Inc., Ampere, N. J.

DIES—Bolt Threading
Curtis & Curtis Co., Bridgeport, Ct.
Landis Machine Co., Inc., Waynesboro, Pa.

DIES—Drop Forging
Little Giant Company, Mankato, Minn.

DIES—Embossing and Stamping
Bossert Corp., The, Utica, N. Y.
Hogson & Pettis Mfg. Co., New Haven, Ct.
Holmes Special Tool Co., New Haven, Conn.
Schwerdtle Stamp Co., Bridgeport, Ct.

DIES—Gripping and Heading
Marchant, Geo. F., Co., Chicago, Ill.

DIES—Pipe Threading
Bignall & Keeler Mch. Wks., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Ct.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Machine Co., Springfield, Vt.
Murphy Mach. & Tool Co., Detroit, Mich.

DIES—Sheet Metal Working
Adrianne Machine Works, Inc., 82 Richards St., Brooklyn, N. Y.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Harry Brothers Mfg. Co., Detroit, Mich.
Heints Mfg. Co., Philadelphia, Pa.
Jahn, B., Mfg. Co., The, New Britain, Conn.

- Mehl Machine Tool & Die Co.,** Roselle, N. J.
New England Pressed Steel Co., Natick, Mass.
Pennsylvania Tool & Mfg. Co., 10 W. Gay St., York, Pa.
Superior Tool Wks., Chicago, Ill.
Toledo Mach. & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Worcester Stamped Metal Co., Worcester, Mass.
Zeh & Hahnemann Co., Newark, N. J.
- DISCS—Abrasive**
Gardner Machine Co., Beloit, Wis.
- DOORS AND SHUTTERS—Steel or Wood Rolling**
Kinnear Mfg. Co., Columbus, O.
- DRAWN WORK—Metal—See Stampings or Drawings—Metal**
- DRILL HEADS—Multiple**
Baker Bros., Inc., Toledo, O.
U. S. Drill Head Co., Cincinnati, Ohio.
- DRILLING MACHINES—Automatic**
Barnes Drill Co., Rockford, Ill.
- DRILLING MACHINES—Bench**
Barnes, W. F. & John Co., Rockford, Ill.
Kingsbury Mfg. Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.
Merit Oil Equipment Co., Cleveland, Ohio.
- DRILLING MACHINES—Horizontal**
Baker Bros., Inc., Toledo, O.
Barnes, W. F. & John Co., Rockford, Ill.
Kingsbury Mfg. Co., Keene, N. H.
- DRILLING MACHINES—Multiple Spindle**
Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Rockford, Ill.
Consolidated Mach. Tool Corp. of America, Wilmington, Del.
Merit Oil Equipment Co., Cleveland, Ohio.
U. S. Drill Head Co., Cincinnati, Ohio.
- DRILLING MACHINES—Multiple Spindle, Adjustable**
National Automatic Tool Co., Richmond, Ind.
- DRILLING MACHINES—Multiple Spindle, Horizontal**
National Automatic Tool Co., Richmond, Ind.
- DRILLING MACHINES—Multiple Spindle, Vertical**
National Automatic Tool Co., Richmond, Ind.
- DRILLING MACHINES—Portable**
Cleveland Punch & Shear Wks. Co., Cleve., O.
- DRILLING MACHINES—Portable Electric**
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Independent Pneumatic Tool Co., Chicago, Ill.
U. S. Electrical Tool Co., The, Cincinnati, O.
- DRILLING MACHINES—Portable Pneumatic**
Buckeye Portable Tool Co., The, Dayton, Ohio.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleve., O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Hand Co., 11 B'way, New York City.
- DRILLING MACHINES—Radial**
American Tool works Co., Cincinnati, O.
Cincinnati Bickford Tool Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Reed-Prentice Co., Worcester, Mass.
Ryerson, Jos. T. & Son, Inc., Chicago, Ill.
Taylor & Fenn Co., Hartford, Ct.
- DRILLING MACHINES—Rock**
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 B'way, N. Y. C.
- DRILLING MACHINES—Second Hand**
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
- DRILLING MACHINES—Sensitive**
Leland-Gifford Co., Worcester, Mass.
Merit Oil Equipment Co., Cleveland, Ohio.
Taylor & Fenn Co., Hartford, Ct.
U. S. Drill Head Co., Cincinnati, Ohio.
- DRILLING MACHINES—Upright**
Barnes, W. F. & John Co., Rockford, Ill.
- DRILLING MACHINES—Vertical**
Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Rockford, Ill.
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Bickford Tool Co., Cincinnati, O.
McCabe, J. J., Lathe & Machry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.
Prentiss, Henry & Co., Inc., 149 Broadway, New York City.
Ryerson, Jos. T. & Son, Inc., Chicago, Ill.
- DRILLS—Ratchet**
Armstrong Bros. Tool Co., Chicago, Ill.
- DRINKING FOUNTAINS**
Loeber, Henry G., Company, 151 E. 126th St., New York City.
- DRIVES—Gear and Rope**
Mesta Machine Co., Pittsburgh, Pa.
- DROP FORGINGS—See Forgings**
- DROP HAMMERS—See Hammers—Drop**
- DROP PRESSES—See Presses—Drop**
- DRYERS FOR ALL MATERIAL**
American Blower Co., Detroit, Mich.
Duff Patents Co., Inc., Pittsburgh, Pa.
- DUST COLLECTORS**
Knickerbocker Co., Jackson, Mich.
Pangborn Corporation, Hagerstown, Md.
Sly, W. W., Mfg. Company, Cleveland, O.
Sterling Blower Co., Hartford, Ct.
- EJECTOR—Punch Press, Pneumatic**
Logansport Mch. Co., The, Logansport, Ind.
- ELECTRIC WELDING—See Welding—Electric**
- ELECTRICAL EQUIPMENT**
General Electric Co., Schenectady, N. Y.
- ELECTRICAL MACHINERY—Second Hand**
Land, L. J., 207 Centre St., New York City.
Niles, F. H., & Co., Inc., Woorworth Bldg., New York City.
Nussbaum, V. M., & Co., Fort Wayne, Ind.
Handle Machinery Co., Cincinnati, O.
Sachsenmaier, Geo., Co., Philadelphia, Pa.
- ELECTRICAL WIRES**
American Steel & Wire Co., Chicago, Ill.
- ELEVATORS—Portable**
Lewis-Shepard Co., Boston, Mass.
- ELEVATORS—Steam Hydraulic**
Ridgway, Craig & Son Co., Coatesville, Pa.
- EMERY WHEELS—See Grinding Wheels**
- ENAMELING**
Geuder, Paeschke & Frey Co. (Contract Mfg. Division), Milwaukee, Wis.
- ENGINEERS—Consulting**
Brassart, H. A. & Co., Chicago, Ill.
Chase, Frank D., Inc., Chicago, Ill.
Day & Zimmermann, Inc., Philadelphia, Pa.
Ellis, Frank I., Pittsburgh, Pa.
Frey Engineering Co., Chicago, Ill.
Lane, H. M., Co., Detroit, Mich.
McKee, Arthur G., & Co., Cleveland, O.
Moore, W. E., & Co., Pittsburgh, Pa.
Perin, C. P.—S. M. Marshall, 40 West 40th St., New York City.
- ENGINEERS—Foundry**
Austin Co., The, Cleveland, Ohio.
Chase, Frank D., Inc., Chicago, Ill.
Lane, H. M., Co., Detroit, Mich.
- ENGINEERS—Metallurgical**
Gathmann Engineering Co., Baltimore, Md.
- ENGINEERS AND CONTRACTORS**
Austin Co., The, Cleveland, Ohio.
Broslus, Edgar E., Pittsburgh, Pa.
Chase, Frank D., Inc., Chicago, Ill.
Day & Zimmermann, Inc., Philadelphia, Pa.
Ferguson, H. K., Company, Cleveland, O.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland, O.
McKee, Willie, Cleveland, O.
Moore, W. E., & Co., Pittsburgh, Pa.
Pennsylvania Engrg. Works, New Castle, Pa.
Smythe, S. R., Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
- ENGINES—Blowing**
Mackintosh-Hemphill Company, Pittsburgh, Pa.
- ENGINES—Gas and Gasoline**
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
National Transit Pump & Mach. Co., Oil City, Pa.
Worthington Pump & Machry. Corp., 115 B'way, New York City.
- ENGINES—Oil**
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Worthington Pump & Machry. Corp., 115 B'way, New York City.
- ENGINES—Second Hand**
Harris Bros. Co., Chicago, Ill.
Hooper-Momberger Co., 90 West St., N. Y. C.
Schultz, A. L., & Son, Chicago, Ill.
- ENGINES—Steam**
Troy Engine & Mch. Co., Troy, Pa.
- EXHAUST HEADS**
Sterling Blower Co., Hartford, Ct.
- EXHAUSTERS—Gas**
Connersville Blower Co., Connersville, Ind.
Spencer Turbine Co., Hartford, Ct.
- EYELET MACHINES**
Manville, E. J., Machine Co., Waterbury, Ct.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Ct.
- EYELETS**
Platt Bros. & Co., The, Waterbury, Ct.
- FACERS—Spot**
Gairing Tool Co., Inc., The, Detroit, Mich.
- FACING HEADS**
Mummert-Dixon Co., Hanover, Pa.
- FACTORY CONSTRUCTION**
Austin Co., The, Cleveland, Ohio.
- FEED WATER HEATERS AND PURIFIERS**
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Scalfe, William B., & Sons Co., Pitts., Pa.
Worthington Pump & Machry. Corp., 115 B'way, New York City.
- FELTS—Wool Mechanical**
Booth Felt Co., Inc., The, 477-478 19th St., Brooklyn, N. Y.
- FENCES—Woven Wire**
American Steel & Wire Co., Chicago, Ill.
Gulf States Steel Co., Birmingham, Ala.
- FENCING—Wire**
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh, Steel Co., Pittsburgh, Pa.
- FERRO ALLOYS—Chromium**
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Lavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.
Samuel, Frank, & Co., Philadelphia, Pa.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRO ALLOYS—Manganese**
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Hardy, Charles, Inc., 100 E. 42d St., N. Y. C.
Lavino, E. J., & Co., Philadelphia, Pa.
Leavitt, C. W., & Co., 30 Church St., N. Y. C.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
Samuel, Frank, & Co., Philadelphia, Pa.
- FERRO ALLOYS—Molybdenum**
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRO ALLOYS—Silico Manganese**
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Southern Ferro-Alloys Co., Chattanooga, Tenn.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRO ALLOYS—Silicon**
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Keokuk Electro-Metals Co., Keokuk, Iowa.
Lavino, E. J., & Co., Philadelphia, Pa.
Pittsburgh Metallurgical Co., Niagara Falls, N. Y.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
Samuel, Frank, & Co., Philadelphia, Pa.
Southern Ferro Alloys Co., Chattanooga, Tenn.
Tutein, E. Arthur, Inc., Boston, Mass.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRO ALLOYS—Spiegeleisen**
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
- FERRO ALLOYS—Titanium**
Metal & Thermit Corp., 120 B'way, N. Y. C.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
- FERRO ALLOYS—Tungsten**
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRO ALLOYS—Vanadium**
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.
- FERRULES**
Bay State Stpg. Co., Worcester, Mass.
Bridgeport Brass Co., Bridgeport, Conn.
Cleveland Punch & Shear Wks. Co., Cleve., O.
- FIBRE AND FIBRE PRODUCTS—Hard**
National Vulcanized Fibre Co., Wilmington, Del.
Wilmington Fibre Specialty Company, Wilmington, Del.
- FILES AND RASPS**
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
- FILTER CLOTH—Metal**
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
- FILTERS—Drinking Water**
Loeber, Henry G., Company, 151 E. 126th St., New York City.
- FILTERS—Pressure or Gravity**
Scalfe, Wm. B., & Sons Co., Pittsburgh, Pa.
- FIRE CLAY**
Ashland Fire Brick Company, Ashland, Ky.
Crescent Refractories Co., Curwensville, Pa.
Ironton Fire Brick Co., Ironton, O.
Queens Run Refractories Co., Inc., Lock Haven, Pa.
St. Louis Vitrified & Fire Brick Co., St. Louis, Mo.
U. S. Refractories Corp., Mount Union, Pa.
- FITTINGS—Cast Iron**
Ward, J. P., Fdry., Inc., Blossburg, Pa.
- FITTINGS—Hydraulic**
Watson-Stillman Co., 75 West St., N. Y. C.
- FLANGES—Forged Steel**
American Spiral Pipe Works, Chicago, Ill.
Cann & Saul Steel Co., Philadelphia, Pa.
- FLANGES—Iron or Steel**
Jefferson Union Co., Lexington, Mass.
Philadelphia Steel & Iron Co., Phila., Pa.
- FLASKS—Foundry**
Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., Milwaukee, Wis.
Truscon Steel Co., Youngstown, O.
- FLOATS—Seamless Copper**
Naugatuck Mfg. Co., Naugatuck, Ct.

FLOORING—Built-up Wood Blocks

Carter Bloxonend Flooring Co., Kansas City, Mo.

FLOORING—Creosoted Wood

Jennison-Wright Co., Toledo, O.

FLOORING—Metallic VentilatingHendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.**FLOORING—Steel**

Hendrick Mfg. Co., Carbondale, Pa.

FLUORSFARLavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.**FLUX—Welding**

Chemical Treatment Co., Inc., 26 Broadway, New York City.

FORGES—RivetBuffalo Forge Co., 402 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N. Y.**FORGING MACHINES**Acme Machinery Co., Cleveland, O.
National Machinery Co., Tiffin, O.**FORGINGS—Alloy Steel**Bethlehem Steel Company, Bethlehem, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.National Forge & Tool Co., Irvine, Pa.
Vulcan Steam Forging Co., Buffalo, N. Y.**FORGINGS—Brass, Bronze or Copper**Copper & Brass Research Assn., 25 B'way, New York City.
Michigan Smelting & Refining Co., Detroit, Mich.**FORGINGS—Drop, Iron or Steel**Akron-Selle Co., Akron, O.
Atlas Drop Forge Co., Lansing, Mich.
Bearings Co. of America, The, Lancaster, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Canton Forge & Axle Co., Canton, O.
Champion Machine & Forging Co., Cleve., O.
Chester Steel & Forge Co., Chester, Pa.
Clapp, E. D., Mfg. Co., The, Auburn, N. Y.
Cleveland Hardware Co., The, Cleveland, O.
Cott's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Mch. Wks. & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Drop Forging Co. of New York, J. C., N. J.
Eccles, Richard, Co., Auburn, N. Y.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.Federal Drop Forge Co., Lansing, Mich.
General Drop Forge Co., Buffalo, N. Y.
Indianapolis Drop Forging Co., Indianapolis, LaCade Steel Co., St. Louis, Mo.
Leard, Wm., Co., Inc., New Brighton, Pa.
McWilliams, John, & Sons, Jersey City, N. J.
Machinery Forging Co., The, Cleveland, O.
Midwest Forge & Steel Co., East St. Louis, Ill.Milwaukee Forge & Mch. Co., Milwaukee, Wis.
National Forge & Tool Co., Irvine, Pa.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Paul, W. P., Co., Philadelphia, Pa.
Pittsburgh Knife & Forge Co., Coraopolis, Pa.
Philadelphia Steel & Iron Co., Phila., Pa.
Queen City Forging Co., Cincinnati, O.
Rhode Island Tool Co., Providence, R. I.
Richmond Frgs. Corp. (Acce.), Richmond, Va.
Scranton Forging Co., Scranton, Pa.
Storms Drop Forging Co., East Springfield, Mass.Strieby & Foote Co., Newark, N. J.
Tioga Steel & Iron Co., The, Philadelphia, Pa.
Transue & Williams Steel Forging Corp., Alliance, O.Union Switch & Signal Co., Swissvale, Pa.
Vulcan Steam Forging Co., Buffalo, N. Y.
Whitox, D., Mfg. Co., Mechanicsburg, Pa.
Williams, J. H., & Co., Buffalo, N. Y.**FORGINGS—Flat Die**

Machinery Forging Co., The, Cleveland, O.

FORGINGS—Hammered

Jersey Forging Wks., Jersey City, N. J.

FORGINGS—Hollow

Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

FORGINGS—Hydraulic Press, Iron or SteelAtlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Company, Bethlehem, Pa.
Champion Mach. & Forging Co., Cleveland, O.
Mesta Machine Co., Pittsburgh, Pa.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Tioga Steel & Iron Co., The, Philadelphia, Pa.
Wharton, William, Jr., & Co., Inc., Easton, Pa.**FORGINGS—Manganese Steel**

Manganese Steel Forge Co., Philadelphia, Pa.

FORGINGS—Stainless Steel

Firth, Thos., & Sons, Inc., Hartford, Ct.

FORMING AND COILING MACHINES

Yoder Co., The, Cleveland, O.

FOUNDRY EQUIPMENT AND SUPPLIESAmerican Fdry. Equip. Co., Mishawaka, Ind.
Beardsley & Piper Co., Chicago, Ill.
Chemical Treatment Co., Inc., 26 Broadway, New York City.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Clifton-Pratt Co., Cincinnati, O.
Diamond Clamp & Flask Co., Richmond, Ind.
Grimes Molding Mch. Co., Detroit, Mich.
Ingersoll-Rand Co., 11 B'way, New York City.
National Engineering Company, Chicago, Ill.Paxson, J. W., Co., Philadelphia, Pa.
Pettinos, Geo. F., Philadelphia, Pa.
Sly, W. W., Mfg. Company, Cleveland, O.
Truscon Steel Co., Youngstown, O.**FROGS AND SWITCHES—Railway**

Bethlehem Steel Company, Bethlehem, Pa.

FURNACES—Billet or Ingot HeatingHagan, Geo. J., Co., Pittsburgh, Pa.
International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—Blast**Frey Engineering Co., Chicago, Ill.
McKee, Arthur G., & Co., Cleveland, O.
Pennsylvania Engrg. Works, New Castle, Pa.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.**FURNACES—Crucible**International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—Electric Steel Melting**American Bridge Co., 71 Broadway, N. Y. C.
Detroit Electric Furnace Co., Detroit, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Electric Furnace Corp., Pitts., Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
Vom Baur Eng. Corp., 233 B'way, N. Y. C.**FURNACES—Enameling**

International Furnace Co., Pittsburgh, Pa.

FURNACES—ForgingAnthony Co., The, Long Island City, N. Y.
International Furnace Co., Pittsburgh, Pa.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—Heat Treating, Automatic**International Furnace Co., Pittsburgh, Pa.
Rockwell, W. S., Co., 50 Church St., N. Y. C.**FURNACES—Heat Treating, Cyanide or Lead**

American Gas Furnace Co., Elizabeth, N. J.

FURNACES—Heat Treating, ElectricElectric Furnace Co., Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., Pittsburgh, Pa.
Holcroft & Company, Detroit, Mich.
Hoskins Mfg. Co., Detroit, Mich.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
Vom Baur Eng. Corp., 233 B'way, N. Y. C.**FURNACES—Heat Treating, Oil, Gas or Coal Fired**American Gas Furnace Co., Elizabeth, N. J.
Anthony Company, The, Long Island City, N. Y.Best, W. N., Corp., 11 Broadway, N. Y. C.
Economy Furnace Co., The, Chicopee, Mass.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Hagan, Geo. J., Co., Pittsburgh, Pa.
Holcroft & Co., Detroit, Mich.
International Furnace Co., Pittsburgh, Pa.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Surface Combustion Co., 366-368 Gerard Ave., Bronx, N. Y.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—High-Speed Steel**International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—Malleable Melting**

Holcroft & Co., Detroit, Mich.

International Furnace Co., Pittsburgh, Pa.

FURNACES—Non-Ferrous MeltingDetroit Electric Furnace Co., Detroit, Mich.
Electric Furnace Co., Salem, O.
Strong, Carlisle & Hammond Co., The, Cleveland, O.**FURNACES—Open Hearth**Holcroft & Co., Detroit, Mich.
International Furnace Co., Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.**FURNACES—Recuperating**

International Furnace Co., Pittsburgh, Pa.

FURNACES—Rivet Heating

General Electric Co., Schenectady, N. Y.

FURNACES—Wire, Annealing & GalvanizingGeneral Electric Co., Schenectady, N. Y.
International Furnace Co., Pittsburgh, Pa.
Vaughn Mehry. Co., Cuyaboga Falls, Ohio.**FUSE METAL**

Platt Bros. & Co., The, Waterbury, Ct.

GAGES—Pressure and VacuumBristol Co., Waterbury, Ct.
Marshalltown Mfg. Co., Marshalltown, Iowa.**GAGES—Thread Lead**

Jones & Lamson Machine Co., Springfield, Vt.

GALVANIZINGBates Expanded Steel Truss Co., East Chicago, Ind.
Cattle Brothers Corp., Philadelphia, Pa.
Cattle, Joseph P., & Bros., Philadelphia, Pa.
International Derrick & Equipment Co., Columbus, O.**GALVANIZING PLANTS—For Sheets**Erie Foundry Company, Erie, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.**GALVANIZING & TINNING EQUIPMENT—Wire**

Vaughn Mehry. Co., Cuyaboga Falls, Ohio.

GAS CLEANING PLANTSFlinn & Dreffeln Co., Chicago, Ill.
Smith Gas Engineering Co., Dayton, O.**GAS HOLDERS**Chicago Bridge & Iron Wks., Chicago, Ill.
Cruse-Kemper Co., Ambler, Pa.**GAS PRODUCERS**Duff Patents Co., Inc., Pittsburgh, Pa.
Flinn & Dreffeln Co., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wood, R. D., & Co., Philadelphia, Pa.**GAS—Welding**

International Oxygen Co., Newark, N. J.

GASKETS—Felt

Booth Felt Co., Inc., The, 477-478 19th St., Brooklyn, N. Y.

GATES—BlastMiner & Peck Mfg. Co., Derby, Conn.
Rockwell, W. S., Co., 50 Church St., N. Y. C.**GATES—Fence**

American Steel & Wire Co., Chicago, Ill.

GEAR CUTTINGAkron Gear & Engrg. Co., Akron, Ohio.
Albaugh-Dover Mfg. Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Dundore Mfg. Co., Reading, Pa.
Earle Gear & Machine Co., Philadelphia, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Gleason Works, Rochester, N. Y.
Grant Gear Works, Boston, Mass.
Hindley Gear Co., Philadelphia, Pa.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Machine Prod. Co., Cleveland, O.
Melsel Press Mfg. Company, Boston, Mass.
Morgan Construction Co., Worcester, Mass.
Philadelphia Gear Wks., Phila., Pa.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Sommerfeld Mch. & Mfg. Co., Pittsburgh, Pa.
Taylor Wilson Mfg. Co., McKees Rocks, Pa.
Van Dorn & Dutton Co., Cleveland, O.**GEAR CUTTING MACHINES**Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Shaper Co., The, Cincinnati, Ohio.
Gleason Works, Rochester, New York.
Newark Gear Cutting Mch. Co., Newark, N. J.
Whitton, D. E., Mch. Co., New London, Conn.**GEAR DRIVES—Herringbone**Farrel Fdry. & Mch. Co., Buffalo, N. Y.
Lewis Fdry. & Mach. Co., Pittsburgh, Pa.**GEAR HOBBING MACHINES**Gould & Eberhardt, Newark, N. J.
Newark Gear Cutting Mch. Co., Newark, N. J.**GEAR PLANING MACHINES**

Gleason Works, Rochester, N. Y.

GEARS—BevelEarle Gear & Machine Co., Philadelphia, Pa.
Fawcuss Machine Co., Pittsburgh, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Grant Gear Works, Boston, Mass.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, Ohio.**GEARS—Double Helical Cut**De Laval Steam Turbine Co., Trenton, N. J.
Farrel Fdry. & Mch. Co., Buffalo, N. Y.
Foote Bros. Gear & Mch. Co., Chicago, Ill.**GEARS—Enclosed Herringbone Transmission**Farrel Fdry. & Mch. Co., Buffalo, N. Y.
Fawcuss Machine Co., Pittsburgh, Pa.
Foote Bros. Gear & Mch. Co., Chicago, Ill.**GEARS—Heat Treated**Foote Bros. Gear & Mch. Co., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Van Dorn & Dutton Co., Cleveland, O.**GEARS—Herringbone**Bethlehem Steel Co., Bethlehem, Pa.
Earle Gear & Machine Co., Philadelphia, Pa.
Farrel Fdry. & Mch. Co., Buffalo, N. Y.
Fawcuss Machine Co., Pittsburgh, Pa.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Mesta Machine Co., Pittsburgh, Pa.
Niles-Bement-Fond Co., 111 B'way, N. Y. C.
Philadelphia Gear Works, Philadelphia, Pa.**GEARS—Machine Cut**Foote Bros. Gear & Mch. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Melsel Press Mfg. Company, Boston, Mass.
Van Dorn & Dutton Co., Cleveland, O.**GEARS—Machine Molded**

Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

GEARS—Non-Metallic

Akron Gear & Engng. Co., Akron, Ohio.
Boston Gear Works Sales Co., Norfolk Downs, Mass.
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Federal Gear, Inc., Cleveland, Ohio.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, Boston, Mass.
Meisel Press Mfg. Company, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Federal Gear, Inc., Cleveland, Ohio.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Philadelphia Gear Wks., Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Speed Reducing

Cleveland Worm & Gear Co., Cleveland, Ohio.
Farrel Fdry. & Mch. Co., Buffalo, N. Y.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Hindley Gear Co., Philadelphia, Pa.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Philadelphia Gear Wks., Philadelphia, Pa.

GEARS—Spiral

Foot Bros. Gear & Mch. Co., Chicago, Ill.
Philadelphia Gear Wks., Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Spur

Boston Gear Works Sales Co., Norfolk Downs, Mass.
Earle Gear & Mch. Co., Philadelphia, Pa.
Fawcus Machine Co., Pittsburgh, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
Grant Gear Works, Boston, Mass.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Philadelphia Gear Wks., Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Worm

Akron Gear & Engng. Co., Akron, Ohio.
Albaugh-Loyer Mfg. Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, O.
Fawcus Mach. Co., Pittsburgh, Pa.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
Grant Gear Works, Boston, Mass.
Hindley Gear Co., Philadelphia, Pa.
Horsburgh & Scott Co., Cleveland, Ohio.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Worm, Speed Reducers

Cleveland Worm & Gear Co., Cleveland, O.
De Laval Steam Turbine Co., Trenton, N. J.
Foot Bros. Gear & Mch. Co., Chicago, Ill.
Philadelphia Gear Wks., Philadelphia, Pa.

GENERATORS—Acetylene

Air Reduction Sales Co., 342 Madison Ave., New York City.
Imperial Brass Mfg. Co., Chicago, Ill.

GENERATORS—Electric

Archer & Baldwin, Inc., 126 Liberty St., New York City.

GENERATORS—Electric, Second Hand

Belyea Co., Inc., 147 W. 18th St., N. Y. C.
Harris Brothers Co., Chicago, Ill.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.

GLOVES—Asbestos and Fireproof

Safety Equip. Service Co., Cleveland, O.

GLUE HEATERS

Dart, E. M., Mfg. Co., Providence, R. I.

GOGGLES—Grinding and Chipping

Safety Equip. Service Co., Cleveland, O.

GOGGLES—Welding

Safety Equip. Service Co., Cleveland, O.

GRAPHITE

Pettinos, Geo. F., Philadelphia, Pa.

GRATING—Flooring

Irving Iron Works Co., Long Island City, N. Y.

GRATING—Steel

Hendrick Mfg. Co., Carbondale, Pa.

GRATINGS—Area, Sidewalk, Etc.

Hendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.

GREASE AND OIL CUPS

Bay State Stpg. Co., Worcester, Mass.

GREASES

Ohio Grease Co., Loudonville, O.

GRILLES

Hendrick Mfg. Co., Carbondale, Pa.

GRINDING AND POLISHING MACHINES

Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Calder, Geo. H., Lancaster, Pa.
Cleveland Stone Co., The, Cleveland, O.
Dillon Electric Co., Canton, O.
Landis Tool Co., Waynesboro, Pa.
Ransom Mfg. Co., Oshkosh, Wis.

Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, O.
Stow Mfg. Co., Inc., Binghamton, N. Y.
U. S. Electrical Tool Co., Cincinnati, O.

GRINDING MACHINES—Camshaft

Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Cutter and Reamer

Thompson Grinder Co., Springfield, O.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Cylindrical

Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Prentiss, Henry, & Co., 149 Broadway, N. Y.

GRINDING MACHINES—Die

Biggall & Keeler Mch. Wks., Edwardsville, Ill.

GRINDING MACHINES—Disc

Gardner Mach. Co., Beloit, Wis.

GRINDING MACHINES—Drill

Landis Tool Co., Waynesboro, Pa.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Internal

Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Prentiss, Henry, & Co., Inc., 149 B'way, New York City.
Rivett Lathe & Grinder Corp., Boston, Mass.

GRINDING MACHINES—Machine Knives

Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.

GRINDING MACHINES—Portable Pneumatic

Buckeye Portable Tool Co., The, Dayton, Ohio.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDING MACHINES—Portable, Radial

Swing
Mummert-Dixon Co., Hanover, Pa.

GRINDING MACHINES—Second Hand

Eddy, E. A., Mchry. Co., The, Providence, R. I.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Morey & Co., Inc., 410 Broome St., N. Y. C.

GRINDING MACHINES—Snagging

Ransom Mfg. Co., Oshkosh, Wis.
U. S. Electrical Tool Co., Cincinnati, Ohio.

GRINDING MACHINES—Surface

Abrasive Machine Tool Company, East Providence, R. I.
Blanchard Mach. Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Heald Machine Co., Worcester, Mass.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Swing Frame

Cleveland Stone Co., The, Cleveland, O.
Pittsburgh Grinding Wheel Co., Rochester, Pa.
Sterling Grinding Wheel Co., Tiffin, O.

GRINDING MACHINES—Tool

Baird Mach. Co., Bridgeport, Ct.
Blake & Johnson Co., Waterbury, Ct.
Dillon Electric Co., Canton, O.
Landis Tool Co., Waynesboro, Pa.
Ransom Mfg. Co., Oshkosh, Wis.
Taylor & Fenn Co., Hartford, Ct.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Universal

Landis Tool Co., Waynesboro, Pa.
Simmons Mach. Tool Corp., Albany, N. Y.
Thompson Grinder Co., Springfield, O.

GRINDING MACHINES—Vertical Surface

Blanchard Mach. Co., Cambridge, Mass.

GRINDING STONES

Cleveland Stone Company, The, Cleveland, O.

GRINDING WHEEL DRESSERS AND CUTTERS

Calder, Geo. H., Lancaster, Pa.
Desmond-Stephan Mfg. Co., Urbana, O.
Dickinson, Thos. L., 34 Gold St., N. Y. C.
Westfield Grinding Wheel Co., Westfield, Mass.

GRINDING WHEEL STANDS—Bench and Floor

Cleveland Punch & Shear Wks. Co., Cleve., O.
Dillon Electric Co., Canton, O.

GRINDING WHEELS

Cleveland Stone Co., The, Cleveland, O.
New York Belting & Packing Co., 91-93 Chambers Street, New York City.
Pittsburgh Grinding Wheel Co., Rochester, Pa.
Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, O.
Westfield Grinding Wheel Co., Westfield, Mass.

GUARDS—Lamp

Hubbell, Harvey, Inc., Bridgeport, Conn.

GUARDS—Machinery

Safety Equip. Service Co., Cleveland, O.

HACK SAW BLADES—See Saws—Hack Saw Blades**HACK SAW MACHINES**

Armstrong-Blum Mfg. Co., Chicago, Ill.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Peerless Machine Co., Racine, Wis.

HAMMERS—Air

Nazel Engng. & Mch. Wks., Philadelphia, Pa.

HAMMERS—Belt and Motor Driven

Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.
Bradley, C. C., & Son, Inc., Syracuse, N. Y.
Little Giant Company, Mankato, Minn.
Nazel Engng. & Mch. Wks., Philadelphia, Pa.
Toledo Mach. & Tool Co., Toledo, O.
West Tire Setter Co., The, Rochester, N. Y.

HAMMERS—Blacksmiths' Forging

Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.

HAMMERS—Board Drop

Chambersburg Engng. Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.

HAMMERS—Drop

Chambersburg Engng. Co., Chambersburg, Pa.
Erie Foundry Company, Erie, Pa.
Herrill Bros., Maspeth, N. Y.
Miner & Peck Mfg. Co., Derby, Conn.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Standard Machinery Co., Auburn, R. I.
Williams, White & Co., Moline, Ill.

HAMMERS—Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleve., O.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 B'way, New York City.

HAMMERS—Pneumatic Forging

Chambersburg Engng. Co., Chambersburg, Pa.
Nazel Engng. & Mch. Wks., Philadelphia, Pa.
Sullivan Machinery Co., Chicago, Ill.

HAMMERS—Power

Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.
Little Giant Company, Mankato, Minn.

HAMMERS—Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

HAMMERS—Steam

Chambersburg Engng. Co., Chambersburg, Pa.
Erie Foundry Company, Erie, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

HANGERS—Factory Door

Myers, F. E., & Bro. Co., Ashland, O.

HANGERS—Shaft

Falls Clutch & Mchry. Co., Cuyahoga Falls, O.
Hyatt Roller Bearing Co., Newark, N. J.
Hyman, Joseph, & Sons, Philadelphia, Pa.
Jones, W. A., Foundry & Mch. Co., 4434 W. Roosevelt Road, Chicago, Ill.

HARDNESS TESTING MACHINES

Shore Instrument & Mfg. Co., Inc., Jamaica, L. I., N. Y.
Wilson-Macullen Co., Inc., 738 E. 143d St., New York City.

HARDWARE—Wagon

Cleveland Hardware Co., Cleveland, Ohio.
Eberhard Mfg. Co., Cleveland, Ohio.

HEAT TREATING

Bellis Heat Treating Co., Branford, Conn.
General Mach. Works, York, Pa.
Machine Prod. Co., The, Cleveland, O.

HEATING AND VENTILATING APPARATUS

Buffalo Forge Co., 402 B'way, Buffalo, N. Y.

HELMETS—Sand Blast and Welding

Safety Equip. Service Co., Cleveland, O.

HINGES—Invisible

Soss Mfg. Co., Grand Ave. & Bergen St., Brooklyn, N. Y.

HINGES—Wrought Brass Butt

Root Co., Bristol, Conn.

HOBS—Formed and Ground

National Twist Drill & Tool Co., Detroit, Mich.

HOISTING MACHINES

Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Air

Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Detroit Hoist & Mach. Co., Detroit, Mich.
Hanna Eng. Works, Chicago, Ill.
Ingersoll-Rand Co., 11 B'way, New York City.
Northern Engineering Works, 212 Chene St., Detroit, Mich.

HOISTS—Chain

Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Ford Chain Block Co., Philadelphia, Pa.
Wright Mfg. Co., Lisbon, O.

HOISTS—Electric

American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Rox, Alfred, & Co., Inc., Philadelphia, Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Electric Tramrail, Wickliffe, Ohio.

Detroit Hoist & Mach. Co., Detroit, Mich.
 Drake Electric Hoist Co., Inc., Friendship, N. Y.
 Euclid Crane & Hoist Co., Euclid, O.
 Harnischfeger Corp., Milwaukee, Wis.
 Link-Belt Co., Chicago, Ill.
 McCollum Hoist & Mfg. Co., Downers Grove, Ill.
 Mallory Machinery Corp., Baltimore, Md.
 Maris Brothers, Inc., Philadelphia, Pa.
 Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
 Payne, N. B., & Co., 25 Church St., N. Y. C.
 Roeper Crane & Hoist Works, Inc., Reading, Pa.
 Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOIST—(Electric) Second Hand

Goodman Elec. Mchry. Co., Newark, N. J.

HOISTS—Electric Traveling

American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
 Box, Alfred, & Co., Inc., Philadelphia, Pa.
 Drake Electric Hoist Co., Inc., Friendship, N. Y.
 Euclid Crane & Hoist Co., Euclid, Ohio.
 Harnischfeger Corp., Milwaukee, Wis.
 Northern Engineering Works, 212 Chene St., Detroit, Mich.
 Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Mono-rail

American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
 Cleveland Electric Tramrail, Wickliffe, Ohio.
 Euclid Crane & Hoist Co., Euclid, O.
 Harnischfeger Corp., Milwaukee, Wis.
 Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Second Hand

Harris Bros. Co., Chicago, Ill.

HOLDERS—Nipple

Curtis & Curtis Co., Bridgeport, Ct.

HOOPS—Wire

American Steel & Wire Co., Chicago, Ill.

HOOPS AND BANDS

American Tube & Stpg. Co., Bridgeport, Ct.
 De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.
 Geneva Metal Wheel Co., 145 Railroad St., Geneva, O.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
 Sharon Steel Hoop Co., Sharon, Pa.
 Stanley Works, New Britain, Conn.

HOSE—Air, Oil, Steam and Water

American Metal Hose Co., Waterbury, Ct.
 Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
 New York Belting & Packing Co., 91-93 Chambers St., New York City.
 Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

HOSE—Flexible Metallic

American Metal Hose Co., Waterbury, Ct.
 Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

HOSE—Rubber

New York Belting & Packing Co., 91-93 Chambers Street, New York City.

HYDRANTS—Fire

Wood, R. D., & Co., Philadelphia, Pa.

HYDRAULIC MACHINERY

Bethlehem Steel Co., Bethlehem, Pa.
 Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
 Chambersburg Engrg. Co., Chambersburg, Pa.
 Elmes, Chas. F. Engrg. Wks., Chicago, Ill.
 French Oil Mill Mchry. Co., Piqua, Ohio.
 Morgan Engineering Co., Alliance, O.
 Watson-Stillman Co., 75 West St., N. Y. C.
 Wood, R. D., & Co., Philadelphia, Pa.

HYDROGEN

International Oxygen Co., Newark, N. J.

HYPODERMIC NEEDLE TUBING

Sumnerhill Tubing Co., Bridgeport, Montgomery County, Pa.

INGOT MOLDS

Bethlehem Steel Co., Bethlehem, Pa.
 Gathmann Engineering Co., Baltimore, Md.
 Penn Mold & Mfg. Co., The, Wheeling, W. Va.
 Valley Mould & Iron Corp., Sharpsville, Pa.

INGOTS—Aluminum

Erdle Perforating Co., Rochester, N. Y.
 Leavitt, C. W., & Co., 30 Church St., N. Y. C.

INGOTS—Brass, Bronze or Copper

Michigan Smelting & Refining Co., Detroit, Mich.

INGOTS—Copper and Bronze

Copper & Brass Research Assn., 25 B'way, New York City.

INGOTS—Steel

Belle City Malleable Iron Co., Racine, Wis.

INSTRUMENTS—Recording

Bristol Co., Waterbury, Ct.

INSULATION—Boiler, Furnace, etc.

Celite Products Co., 11 Broadway, N. Y. C.

INSULATION—Fibre

National Vulcanized Fibre Co., Wilmington, Del.

INSULATION—High Temperature

Celite Products Co., 11 B'way, N. Y. C.

INSULATION—Laminated Bakelite

National Vulcanized Fibre Co., Wilmington, Del.

IRON BARS

Lockhart Iron & Steel Co., Pittsburgh, Pa.

IRON—Chain

Bethlehem Steel Co., Bethlehem, Pa.

IRON—Forging Blooms

Lockhart Iron & Steel Co., Pittsburgh, Pa.

IRON—Rustless

Ludlum Steel Co., Watervliet, N. Y.

IRON—Stainless

Allegheny Steel Co., Brackenridge, Pa.
 Fifth-Sterling Steel Co., McKeesport, Pa.
 United Alloy Steel Corp., Canton, Ohio.

IRON—Staybolt

Bethlehem Steel Co., Bethlehem, Pa.
 Lockhart Iron & Steel Co., Pittsburgh, Pa.
 Ryerson, Jos. T., & Sons, Inc., Chicago, Ill.

IRON OR STEEL—Swedish

Ljusne-Woxna Co., Ltd., Ljusne, Sweden
 Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.

IRONWORK—Ornamental

Snead Architectural Iron Wks., Louisville, Ky.

IRONWORK—Sheet Steel and Angle

Kirk & Blum Mfg. Co., 2851 Spring Grove Ave., Cincinnati, O.

JIGS, FIXTURES, TOOLS, ETC.

Mehl Machine Tool & Die Co., Roselle, N. J.
 Pennsylvania Tool & Mfg. Co., 10 W. Gay St., York, Pa.
 Reliable Mch. Co., Rockford, Ill.
 Screw Machine Products Corp., Providence, R. I.

KEYSEATING MACHINES

Baker Bros., Inc., Toledo, O.
 Davis Keyseater Company, Rochester, N. Y.
 Morton Mfg. Co., Muskegon, Mich.

KEYS—Machine

Leard, Wm., Co., Inc., New Brighton, Pa.
 Morton Mfg. Co., Muskegon, Mich.

KEYS—Riveted

Hindley Mfg. Co., Valley Falls, R. I.

KNIVES—Machine

Simonds Saw & Steel Co., Fitchburg, Mass.
 Wapakoneta Machine Co., Wapakoneta, O.

LACING—Belt, Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
 Graton & Knight Mfg. Co., Worcester, Mass.
 Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.

LATH—Metal

Truscon Steel Co., Youngstown, O.

LATHE ACCESSORIES AND ATTACHMENTS

Steinle Turret Machine Co., Madison, Wis.

LATHE SPINDLES—Solid and Hollow Bored

National Forge & Tool Co., Irvine, Pa.

LATHES—Automatic

Bullard Machine Tool Co., Bridgeport, Ct.
 Jones & Lamson Machine Co., Springfield, Vt.

LATHES—Bench

Rivett Lathe & Grinder Corp., Boston, Mass.

LATHES—Chucking

International Machine Tool Co., Ind., Ind.
 Jones & Lamson Mach. Co., Springfield, Vt.

LATHES—Engine

American Tool Works Co., Cincinnati, O.
 Consolidated Mach. Tool Corp. of America, Wilmington, Del.
 Greaves-Klusman Tool Co., Cincinnati, O.
 Hill, Clarke & Co., Inc., Boston, Mass.
 Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
 Lodge & Shipley Mch. Tool Co., Cincinnati, O.
 McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
 McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
 Monarch Machine Tool Co., The, Sidney, O.
 Niles-Bement-Pond Co., 111 B'way, N. Y. C.
 Osborne & Sexton Machinery Co., Columbus, O.
 Rahn-Larmon Co., The, Cincinnati, O.
 Reed-Prentice Co., Worcester, Mass.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
 Wickes Brothers, Saginaw, Mich.

LATHES—Extension Gap

Rahn-Larmon Co., The, Cincinnati, O.

LATHES—Foot Power

Barnes, W. F., & John Co., Rockford, Ill.

LATHES—Polishing and Buffing

Geier, P. A., Co., The, Cleveland, Ohio.

LATHES—Roll

Lewis Foundry & Mach. Co., Pittsburgh, Pa.
 Standard Engineering Co., Ellwood City, Pa.
 United Engrg. & Fdy. Co., Pittsburgh, Pa.

LATHES—Screw-Cutting

Automatic Machine Co., The, Bridgeport, Ct.
 Gisholt Machine Co., Madison, Wis.
 Rivett Lathe & Grinder Corp., Boston, Mass.

LATHES—Second-Hand

Botwinik Bros., Inc., New Haven, Conn.
 Eddy, E. A., Mchry. Co., The, Providence, R. I.
 Harris Bros. Co., Chicago, Ill.
 Hill, Clarke & Co., Inc., Boston, Mass.
 Lamberg, A., & Co., 241 Centre St., N. Y. C.
 McCabe, J. J., Lathe & Machy. Corp., 149 Broadway, New York City.
 McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
 Morey & Co., Inc., 410 Broome St., N. Y. C.
 Russell Machine Co., Pittsburgh, Pa.
 Simmons Mach. Tool Corp., Albany, N. Y.

LATHES—Spinning

Adriance Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.

LATHES—Turret

Acme Machine Tool Co., Cincinnati, O.
 Bullard Machine Tool Co., Bridgeport, Ct.
 Gisholt Machine Co., Madison, Wis.
 International Machine Tool Co., Ind., Ind.
 Jones & Lamson Mach. Co., Springfield, Vt.
 Steinle Turret Mach. Co., Madison, Wis.

LATHES—Wheel and Axle

Niles-Bement-Pond Co., 111 B'way, N. Y. C.

LEATHER—Cup

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
 Graton & Knight Mfg. Co., Worcester, Mass.
 Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.

LEATHER—Hydraulic

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
 Graton & Knight Mfg. Co., Worcester, Mass.
 Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.

LEGGINS—Foundry

Safety Equip. Service Co., Cleveland, O.

LINING—Converter

Edge Hill Silica Rock Co., New Brunswick, N. J.

LINING—Cupola

Edge Hill Silica Rock Co., New Brunswick, N. J.
 Plibrico Jointless Firebrick Co., Chicago, Ill.

LINKS—Chain

Laughlin, Thomas, Co., The, Portland, Me.

LOCOMOTIVES—Electric

Atlas Car & Mfg. Co., Cleveland, O.
 General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline

Fate-Hoot-Heath Co., Plymouth, O.
 Vulcan Iron Works, Wilkes-Barre, Pa.

LOCOMOTIVES—Industrial

Fate-Hoot-Heath Co., Plymouth, O.

LOCOMOTIVES—Second Hand

Hyman-Michaels Co., Chicago, Ill.

LOCOMOTIVES—Steam

Vulcan Iron Works, Wilkes-Barre, Pa.

LOCOMOTIVES—Storage Battery

Atlas Car & Mfg. Co., Cleveland, O.

LUBRICANTS

Ohio Grease Co., Londonville, O.

LUMBER—Creosoted or Zinc Treated

Century Wood Preserving Co., Pittsburgh, Pa.
 Jennison-Wright Co., Toledo, O.

LUMBER—Flask

Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

LUMBER—Pattern

Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

LUMBER—Template

Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

MACHINE WORK

Adamsen Mach. Co., The, Akron, O.
 Cleveland Machinery Co., Cleveland, Tenn.
 Colt's Patent Fire Arms Mfg. Co., Hartford, Ct.
 Columbia Mach. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
 Cowdrey, C. H., Machine Works, 30 Summer St., Fitchburg, Mass.
 Diets Machine Works, Philadelphia, Pa.
 Frederick Iron & Steel Co., Frederick, Md.
 Frisbie Motor Company, The, Middletown, Ct.
 General Mach. Works, York, Pa.
 Hanna Engineering Works, Chicago, Ill.
 Hartford Special Machinery Co., The, Hartford, Ct.
 Hershey Mch. & Fdry. Co., Manheim, Pa.
 Johnson, Carlyle, Mach. Co., Manchester, Ct.
 Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
 Lambert & Todd Mach. Co., Camden, N. J.
 McCabe, J. J., Lathe & Mchry. Corp., 10th & Brunswick Sts., Jersey City, N. J.
 Matthews, H. A., Mfg. Co., Seymour, Ct.
 Morehouse Machine Co., York, Pa.
 Osborn Mach. Co., Du Bois, Pa.
 P. & W. Mch. & Engineering Co., Cleveland, Ohio.

Porter Machine Co., Inc., Jersey City, N. J.
 Sherwood Mfg. Co., Buffalo, N. Y.
 Sweet & Doyle Foundry & Mach. Co., Troy,
 (Green Island), N. Y.
 Thompson Brothers, Philadelphia, Pa.
 Universal Machine Co., Baltimore, Md.

MACHINERY DEALERS

Adams, Ogden R., Co., Inc., Rochester, N. Y.
 Allen, H. F., Co., Inc., 60 Church St., N. Y. C.
 Bath, Cyril J., & Co., Cleveland O.
 Bennett Mchry. Co., 30 Church St., N. Y. C.
 Bertollette Mch. Tool Co., Inc., Jersey City,
 N. J.
 Carle Mchry. Co., 500 E. Woodbridge St.,
 Detroit, Mich.
 Clifton-Pratt Co., Cincinnati, Ohio.
 Crane-Schleifer-Owens, Inc., Buffalo, N. Y.
 Crawford, F. H., & Co., Inc., 50 Church St.,
 New York City.
 Delta Equipment Co., Philadelphia, Pa.
 Donahue Steel Prod. Co., Chicago, Ill.
 Eastern Machinery Co., Cincinnati, Ohio.
 Eddy, E. A., Mchry. Co., The, Providence,
 R. I.
 Emerman, Louis E., & Co., Chicago, Ill.
 Easley, E. L., Machinery Co., Chicago, Ill.
 Fitzsimmons & Cole Machry. Co., Pittsburgh,
 Pa.
 Harris Bros. Co., Chicago, Ill.
 Hill, Clarke & Co., Inc., Boston, Mass.
 Hill, Clarke & Co. of Chicago, 647 W. Wash-
 ington Blvd., Chicago, Ill.
 Hittner's, Henry A., Sons Co., Philadelphia,
 Pa.
 International Mchry. Co., Detroit, Mich.
 Jones Machine Tool Co., Cincinnati, O.
 Lamberg, A., & Co., 241 Centre St., N. Y. C.
 Larkin, M. D., Co., Dayton, Ohio.
 Lucas, J. L., & Son, Inc., Bridgeport, Conn.
 Lynd-Farquhar Co., Boston, Mass.
 McCabe, J. J., Lathe & Mchry. Corp., 149
 Broadway, New York City.
 McCabe & Sheeran Mchry. Corp., Room 482,
 50 Church St., New York City.
 McCabe, T. B., Philadelphia, Pa.
 Machinery Dealers, Inc., New Haven, Conn.
 Miles Machinery Co., Saginaw, W. S. Mich.
 Morey & Co., Inc., 410 Broome St., N. Y. C.
 Niles-Bement-Pond Co., 111 B'way, N. Y. C.
 Niles, F. H., & Co., Inc., Woolworth Bldg.,
 New York City.
 O'Brien, J. J., Mchry. Co., St. Louis, Mo.
 O'Brien Mchry. Co., Philadelphia, Pa.
 Prentiss, Henry & Co., Inc., 140 B'way, N.Y.C.
 Prussian, M., Mchry. Co., Detroit, Mich.
 Randie Machinery Co., Cincinnati, O.
 Reliance Machinery Sales Co., Pittsburgh, Pa.
 Riverside Mchry. Depot, Detroit, Mich.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
 Samler Bros., Baltimore, Md.
 Severin-Tripp Mchry. Co., 25 Church St.,
 New York City.
 Simmons Mach. Tool Corp., Albany, N. Y.
 Stocker-Rumely-Wachs Co., Chicago, Ill.
 Strafer, A. F., 30 Church St., New York City.
 Sun Mchry. Co., Inc., Newark, N. J.
 Wayne Machine Co., Indianapolis, Ind.
 White, A. D., Machinery Co., Chicago, Ill.
 Wickes Machry. Co., Jersey City, N. J.

ACHINISTS—Contracting

Konigslew, Otto, Mfg. Co., Cleveland, O.

**MACHINISTS' TOOLS AND SUPPLIES—
See Tools****MAGNESITE—Brick or Dead Burnt**

General Refractories Co., Philadelphia, Pa.
 Harbison-Walker Refractories Co., Pittsburgh,
 Pa.
 Lavino, E. J., & Co., Philadelphia, Pa.

MAGNETS—Lifting

Electric Controller & Mfg. Co., Cleveland, O.
 Ohio Electric & Controller Co., Cleveland, O.

MAGNETS—(Lifting) Second Hand

Goodman Elec. Mchry. Co., Newark, N. J.

MALLETS—Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave.,
 Chicago, Ill.

MANDRELS—Expanding

Nicholson, W. H., & Co., 115 Oregon St.,
 Wilkes-Barre, Pa.

MANGANESE METAL

Electro Metallurgical Sales Corp., 30 E. 42nd
 St., N. Y. C.

METAL POLISHING ENGINEERS

Divine Brothers Co., Utica, N. Y.

METAL SPECIALTIES

Accurate Metal Stamping Co., Inc., 136
 Liberty St., New York City.
 American Spring & Mfg. Corp., Holley, Mich.
 Bossert Corp., The, Utica, N. Y.
 Bridgeport Metal Goods Mfg. Co., Bridgeport,
 Conn.
 Cuyahoga Spring Co., Cleveland, O.
 Everitt Co., The, Boston, Mass.
 Fischer, Chas., Spring Co., 240 Kent Ave.,
 Brooklyn, N. Y.
 Geuder, Paeschke & Frey Co. (Contract Mfg.
 Division), Milwaukee, Wis.
 Globe Mach. & Stpg. Co., Cleveland, O.
 Jahn, B., Mfg. Co., The, New Britain, Conn.
 Matthews Mfg. Co., Worcester, Mass.
 Metal Specialty Co., Cincinnati, Ohio.
 Motor Wheel Corp., Lansing, Mich.
 Otto, William H., Metal Goods Corp., Jersey
 City, N. J.
 Rome Mfg. Company, Rome, N. Y.
 Thorn, J. S., Co., Philadelphia, Pa.
 Truscon Steel Co., Youngstown, O.
 Worcester Stamped Metal Co., Worcester,
 Mass.

MICA SCHIST

Edge Hill Silica Rock Co., New Brunswick,
 N. J.

**MILLING MACHINE ACCESSORIES AND
ATTACHMENTS**

Kearney & Trecker Corp., Milwaukee, Wis.

MILLING MACHINES—Horizontal

Brown & Sharpe Mfg. Co., Providence, R. I.
 Consolidated Mach. Tool Corp. of America,
 Wilmington, Del.
 Kearney & Trecker Corp., Milwaukee, Wis.
 Kempsmith Mfg. Co., Milwaukee, Wis.
 McCabe, J. J., Lathe & Mchry. Corp., 149
 Broadway, New York City.
 McCabe & Sheeran Machinery Corp., Room
 482, 50 Church St., New York City.
 Niles-Bement-Pond Co., 111 B'way, N. Y. C.

MILLING MACHINES—Manufacturing

McCabe, J. J., Lathe & Machinery Corp., 149
 Broadway, New York City.
 McCabe & Sheeran Machry. Corp., Room 482,
 50 Church St., New York City.

MILLING MACHINES—Plain

McCabe, J. J., Lathe & Machinery Corp., 149
 Broadway, New York City.
 McCabe & Sheeran Machry. Corp., Room 482,
 50 Church St., New York City.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

MILLING MACHINES—Second Hand

Botwinik Bros., Inc., New Haven, Conn.
 Harris Bros. Co., Chicago, Ill.
 Hill, Clarke & Co., Inc., Boston, Mass.
 Lamberg, A., & Co., 241 Centre St., N. Y. C.
 McCabe, J. J., Lathe & Mchry. Corp., 149
 Broadway, New York City.
 McCabe & Sheeran Machry. Corp., Room 482,
 50 Church St., New York City.
 Russell Machine Co., Pittsburgh, Pa.
 Simmons Mach. Tool Corp., Albany, N. Y.

MILLING MACHINES—Universal

Kempsmith Mfg. Co., Milwaukee, Wis.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

MILLING MACHINES—Vertical

Automatic Machine Co., The, Bridgeport, Ct.
 Kempsmith Mfg. Co., Milwaukee, Wis.
 Niles-Bement-Pond Co., 111 B'way, N. Y. C.

MIXING MACHINES—Sand

Bartlett, C. O., & Snow Co., Cleveland, O.
 Beardsley & Piper Co., Chicago, Ill.
 National Engineering Co., Chicago, Ill.

MOLDING MACHINES—Combination

American Fdry. Equip. Co., Mishawaka, Ind.

MOLDING MACHINES—Jarring (Air)

Arcade Mfg. Co., Freeport, Ill.
 Beardsley & Piper Co., Chicago, Ill.
 Nicholls, Wm. H., Co., Inc., 4 College Place,
 Brooklyn, N. Y.

**MOLDING MACHINES—Rollover (Hand
and Power Operated)**

Arcade Mfg. Co., Freeport, Ill.
 Grimes Molding Mch. Co., Detroit, Mich.

MOLDING MACHINES—Stripping Plate

Nicholls, Wm. H., Co., Inc., 4 College Place,
 Brooklyn, N. Y.

MONEL METAL

Williams & Co., Inc., 911 Pennsylvania Ave.,
 N. E., Pittsburgh, Pa.

MOTORS—Electric

Baldor Electric Company, St. Louis, Mo.
 Ohio Electric & Controller Co., Cleveland, O.

MOTORS—Electric, Second Hand

Archer & Baldwin, Inc., 126 Liberty St.,
 New York City.
 Belyea Company, Inc., 147 W. 18th St., N.Y.C.
 Botwinik Bros., Inc., New Haven, Conn.
 Delta Equipment Co., Philadelphia, Pa.
 Harris Bros. Co., Chicago, Ill.
 Land, L. J., 207 Centre St., New York City.
 McCoy-Brandt Machry. Co., Pittsburgh, Pa.
 Machinery Dealers, Inc., New Haven, Conn.
 O'Brien Machry. Co., Philadelphia, Pa.
 Sachsenmaier, Geo., Co., Philadelphia, Pa.

NAILS—Cement Coated

American Steel Co., Ellwood City, Pa.
 American Steel & Wire Co., Chicago, Ill.

NAILS—Copper Wire

Conklin, T. E., Brass & Copper Co., Inc., 54
 Lafayette St., New York City.

NAILS—Cut Copper

Conklin, T. E., Brass & Copper Co., Inc., 54
 Lafayette St., New York City.

NAILS—Galvanized

American Steel Co., Ellwood City, Pa.
 American Steel & Wire Co., Chicago, Ill.

NAILS—Wire

American Steel & Wire Co., Chicago, Ill.
 Bethlehem Steel Co., Bethlehem, Pa.
 Columbia Steel Corp., San Francisco, Cal.
 Gulf States Steel Co., Birmingham, Ala.
 Pittsburgh Steel Co., Pittsburgh, Pa.
 Townsend Co., New Brighton, Pa.
 Wickwire Bros., Cortland, N. Y.

NICKEL

American Nickel Corp., Pittsburgh, Pa.
 U. S. Nickel Co., New Brunswick, N. J.
 Williams & Co., Inc., 911 Pennsylvania Ave.,
 N. E., Pittsburgh, Pa.

NICKEL ANODES—Rolled and Cast

Seymour Mfg. Co., Seymour, Ct.

NITROGEN

Air Reduction Sales Co., 342 Madison Ave.,
 New York City.
 Linde Air Products Co., The, 30 E. 42nd St.,
 New York City.

NUTS—Brass, Bronze and Copper

Everitt Co., The, Boston, Mass.

NUTS—Castellated

National Acme Co., Cleveland, Ohio.
 Russell, Burdall & Ward Bolt & Nut Co.,
 Port Chester, N. Y.
 Western Screw Prod. Co., St. Louis, Mo.

NUTS—Cold Punched

Pawtucket Mfg. Co., Pawtucket, R. I.
 Russell, Burdall & Ward Bolt & Nut Co.,
 Port Chester, N. Y.
 Palnut Co., The, Irvington, N. J.

NUTS—Semi-Finished

Russell, Burdall & Ward Bolt & Nut Co.,
 Port Chester, N. Y.

**OIL HANDLING SYSTEMS—For Factory,
Mills, Etc.**

Gilbert & Barker Mfg. Co., Springfield, Mass.

ORES—Chrome, Lump and Ground

General Refractories Co., Philadelphia, Pa.
 Lavino, E. J., & Co., Philadelphia, Pa.
 Rogers Brown & Crocker Bros., Inc., 21 East
 40th Street, New York City.
 U. S. Nickel Co., New Brunswick, N. J.

ORES—Iron

Cleveland-Cliffs Iron Co., Cleveland, Ohio.
 Park & Williams, Inc., Philadelphia, Pa.
 Pilling & Co., Inc., Philadelphia, Pa.
 Rogers Brown & Crocker Bros., Inc., 21 East
 40th Street, New York City.
 Savage, John A., & Co., Duluth, Minn.
 Snyder, W. F., & Co., Pittsburgh, Pa.
 Tutela, E. Arthur, Inc., Boston, Mass.

ORES—Manganese

Lavino, E. J., & Co., Philadelphia, Pa.
 Rogers Brown & Crocker Bros., Inc., 21 East
 40th Street, New York City.
 Savage, John A., & Co., Duluth, Minn.

OVENS—Baking

Gehrich Indirect Heat Oven Co., Inc., Long
 Island City, N. Y.
 Oven Equipment & Mfg. Co., New Haven, Ct.
 Steiner, E. E., & Co., Newark, N. J.
 Young Bros., Co., Detroit, Mich.

OVENS—Core

Gehrich Indirect Heat Oven Co., Inc., Long
 Island City, N. Y.
 Holcroft & Company, Detroit, Mich.
 Maehler, Paul, Co., The, Chicago, Ill.
 Sly, W. W., Mfg. Co., Cleveland, Ohio.
 Swartwout Co., The, Cleveland, Ohio.
 Young Bros., Co., Detroit, Mich.

OVENS—Drying

Detroit Sheet Metal Wks., Detroit, Mich.
 Gehrich Indirect Heat Oven Co., Inc., Long
 Island City, N. Y.
 Holcroft & Co., Detroit, Mich.
 Maehler, Paul, Co., The, Chicago, Ill.
 Swartwout Co., The, Cleveland, Ohio.
 Young Bros., Co., Detroit, Mich.

OVENS—Enameling and Japanning

Gehrich Indirect Heat Oven Co., Inc., Long
 Island City, N. Y.
 Maehler, Paul, Co., The, Chicago, Ill.
 Oven Equipment & Mfg. Co., New Haven, Ct.
 Steiner, E. E., & Co., Newark, N. J.
 Swartwout Co., The, Cleveland, Ohio.
 Young Bros., Co., Detroit, Mich.

OVENS—Lacquering

Young Bros., Co., Detroit, Mich.

OXYGEN

Air Reduction Sales Co., 342 Madison Ave.,
 New York City.
 Linde Air Products Co., The, 30 E. 42nd St.,
 New York City.
 International Oxygen Co., Newark, N. J.

PACKING—Leather

Chicago Rawhide Mfg. Co., 1313 Elston Ave.,
 Chicago, Ill.
 Graton & Knight Mfg. Co., Worcester, Mass.
 Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.
 Watson-Stillman Co., 75 West St., N. Y. C.

PACKING—Rubber

Jenkins Bros., 80 White Street, N. Y. C.
 New York Belting & Packing Co., 91-93 Cham-
 bers Street, New York City.

PANS—Grinding

National Engineering Co., Chicago, Ill.

PATENT ATTORNEYS

Boyle, John, Jr., Washington, D. C.

PATTERNS—Wood and Metal

Cleveland Castings Pattern Co., The, Cleve-
 land, O.
 Marion Malleable Iron Works, Marion, Ind.
 Sweet & Doyle Fdry. & Mch. Co., Troy,
 (Green Island), N. Y.

PERFORATED METAL

Chicago Perforating Co., Chicago, Ill.
 Cross Engineering Co., Carbondale, Pa.
 Erdle Perforating Co., Rochester, N. Y.
 Harrington & King Perforating Co., Chicago.
 Hendrick Manufacturing Co., Carbondale, Pa.
 Mundt, Chas., & Sons, Jersey City, N. J.
 Remaly Mfg. Company, Tamaqua, Pa.

BUYERS INDEX

PHOSPHORIZERS

McOullough-Daisell Crucible Co., Pitts., Pa.

PICKLING COMPOUNDS

American Chemical Paint Co., Ambler, Pa.

PIG IRON

Bethlehem Steel Company, Bethlehem, Pa.
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Layno, B. J., & Co., Philadelphia, Pa.
Ljusne-Woxna Co., Ltd., Ljusne, Sweden.
Park & Williams, Inc., Philadelphia, Pa.
Pilling & Co., Inc., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
Savage, John A. & Co., Cincinnati, O.
Snyder, W. P., & Co., Pittsburgh, Pa.
Southern Ferro Alloys Co., Chattanooga, Tenn.
Stewart Furnace Company, The, Cleveland, O.
Tenn. Coal, Iron & R.R. Co., Birmingham, Ala.
Tutein, E. Arthur, Inc., Boston, Mass.
Waldo, Egbert, & McClain, Inc., Buffalo, N. Y.
Walter-Wallingford & Co., Cincinnati, O.
Wickley Spencer Steel Co., 41 E. 42nd St., N. Y. C.

PILING—Steel Sheet

Bethlehem Steel Company, Bethlehem, Pa.
Wenlinger, Inc., 149 Broadway, N. Y. C.

PINIONS—Rolling Mill

Mesta Machine Co., Pittsburgh, Pa.

PIPE—Brass or Copper

Bridgeport Brass Co., Bridgeport, Conn.
Copper & Brass Research Assn., 25 B'way, New York City.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

PIPE—Cast Iron, B. & S. and Flanged

U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

PIPE—Genuine Wrought Iron

Keating, E. F., Co., 452 Water St., N. Y. C.

PIPE—Hammer Welded

National Tube Co., Pittsburgh, Pa.

PIPE—New and Second-Hand

Albert & Davidson Pipe Corp., 256-264 Oakland St., Brooklyn, N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Brooklyn, N. Y.
Atlantic Pipe & Steel Co., 30 Church St., New York City.
Columbia Steel & Tube Corp., Woolworth Bldg., New York City.
Greenpoint Iron & Pipe Corp., Inc., 330-332 Graham Ave., Brooklyn, N. Y.
L. & D. Pipe Supply Co., Inc., 1096 Flushing Ave., Brooklyn, N. Y.
McDowell & Co., Pittsburgh, Pa.
Schreer & Poster, Inc., 211-217 Kent Ave., Brooklyn, N. Y.
Ullman, Jacob, Buffalo, N. Y.

PIPE—Riveted Steel

Abendroth & Root Mfg. Co., Newburgh, N. Y.
Petroleum Iron Works Co., Sharon, Pa.

PIPE—Spiral Riveted

Abendroth & Root Mfg. Co., Newburgh, N. Y.
American Spiral Pipe Works, Chicago, Ill.

PIPE—Standard

Central Tube Co., Pittsburgh, Pa.
Keating, E. F., Co., 452 Water St., N. Y. C.
National Tube Co., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.

PIPE—Wrought Iron

Keating, E. F., Co., 452 Water St., N. Y. C.

PIPE CUTTING AND THREADING MACHINES

Bignall & Keeler Mch. Wks., Edwardsville, Ill.
Chicago Pipethread Machine Co., 1621 Racine St., Racine, Wis.
Curtis & Curtis Co., Bridgeport, Ct.
Jarecki Mfg. Co., Erie, Pa.
Laudis Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo, O.
Murphy Mach. & Tool Co., Detroit, Mich.
Pipe Machry. Co., The, Cleveland, O.
Saunders, D. Sons, Yonkers, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.
Williams Tool Corporation, Erie, Pa.

PIPE FITTINGS

Jarecki Mfg. Co., Erie, Pa.
Malleable Iron Fittings Co., Branford, Ct.
Pittsburgh Valve Fdry. & Con. Co., Pittsburgh, Pa.

PLANING MACHINES—Metal

American Tool Works Co., Cincinnati, O.
Cincinnati Planer Co., The, Cincinnati, O.
Cleveland Planer Co., The, Cleveland, O.
Consolidated Mach. Tool Corp. of America, Wilmington, Del.
Gray, G. A., Co., Cincinnati, O.
Liberty Mch. Tool Co., Hamilton, O.
Morton Mfg. Co., Muskegon, Mich.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Ohio Machine Tool Co., Kenton, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

PLANING MACHINES—Open Side

Automatic Machine Co., The, Bridgeport, Ct.
Cincinnati Planer Co., The, Cincinnati, O.
Cleveland Planer Co., The, Cleveland, O.
Gray, G. A., Co., Cincinnati, O.
Liberty Mch. Tool Co., Hamilton, O.

PLANING MACHINES—Second Hand

Hill, Clarke & Co., Inc., Boston, Mass.

PLANTS FOR SALE

Citizen's Trust Co., Terre Haute, Ind.

PLATERS' CLEANING COMPOUND

Oakley Chemical Co., 22 Thames St., N. Y. C.

PLATES—Alloy Steel

Eddystone Steel Co., Cram Lynne, Pa.

PLATES—Cellar Door and Floor

American Pressed Steel Co., Philadelphia, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Wood, Alan, Iron & Steel Co., Phila., Pa.

PLATES—Felloe

Wrought Washer Mfg. Co., Milwaukee, Wis.

PLATES—Iron and Steel

American Pressed Steel Co., Philadelphia, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Company, Chicago, Ill.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
United Alloy Steel Corp., Canton, O.
Wood, Alan, Iron & Steel Co., Phila., Pa.

PLATES—Manganese Steel

Manganese Steel Forge Co., Philadelphia, Pa.

PLATING—Chrome Alloy

Chemical Treatment Co., Inc., 26 Broadway, New York City.

PLUGS—Core Hole

Hubbard, M. D., Spring Co., Pontiac, Mich.

PLUMBING FIXTURES—Brass

Enterprise Brass Works, Muskegon Heights, Mich.

PNEUMATIC TOOLS

Buckeye Portable Tool Co., The, Dayton, Ohio.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

POLISHING BELTS

Divine Brothers Co., Utica, N. Y.

POLISHING AND BUFFING MACHINERY

Geler, P. A., Co., The, Cleveland, Ohio.

POLISHING MACHINES—Automatic

Divine Brothers Co., Utica, N. Y.

POSTS—Steel Fence

American Steel & Wire Co., Chicago, Ill.

POTS—Lead, Cyanide or Carbonizing

Monroe Steel Castings Co., Monroe, Mich.

POWDERED COAL EQUIPMENT—See Pulverized Coal Equipment

POWER TRANSMITTING MACHINERY

American Pulley Co., Philadelphia, Pa.
Caldwell, H. W., & Son Co., Chicago, Ill.
Falls Clutch & Machinery Co., Cuyahoga Falls, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Schultz, A. L., & Son, Chicago, Ill.

PRESS ATTACHMENTS

Littell, F. J., Mach. Co., Chicago, Ill.

PRESSED STEEL PARTS

Bossert Corp., The, Utica, N. Y.
Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee, Wis.
Metal Specialty Co., Cincinnati, Ohio.
Truscon Steel Co., Youngstown, O.

PRESSES—Arbor

Logansport Mch. Co., The, Logansport, Ind.
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.

PRESSES—Bending or Straightening

Chambersburg Engrg. Co., Chambersburg, Pa.
General Mfg. Co., Detroit, Mich.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Die

Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Drop

Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Standard Machinery Co., Auburn, R. I.

PRESSES—Extrusion

Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Foot

Adrian Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.
Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Ct.
Taylor & Fenn Co., Hartford, Ct.

PRESSES—Forging

General Mfg. Co., Detroit, Mich.
Lucas Mch. Tool Co., Cleveland, Ohio.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Forging

Bethlehem Steel Co., Bethlehem, Pa.
Morgan Engineering Co., Alliance, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Foundry Co., Pitts., Pa.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Hot and Cold Plate

Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Hydraulic

Bethlehem Steel Company, Bethlehem, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.

French Oil Mill Machry. Co., Piqua, O.
Lake Erie Engineering Corp., Buffalo, N. Y.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Oilgear Co., The, 659 Park St., Milwaukee, Wis.
Southwark Fdry. & Mach. Co., Phila., Pa.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.

PRESSES—Hydraulic, Straightening and Assembling

American Broach & Mch. Co., Ann Arbor, Mich.

PRESSES—Power

Adrian Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.
Baird Machine Co., Bridgeport, Ct.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., The, Cincinnati, O.
Etna Machine Co., The, Toledo, O.
General Mfg. Co., Detroit, Mich.
Hyman, Joseph, & Sons, Philadelphia, Pa.
Lefler, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loebough-Jordan Tool & Mch. Co., Elkhart, Ind.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Conn.
Manville, E. J., Mach. Co., Waterbury, Ct.
Niagara Machine & Tool Works, Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Ct.
Robinson, J. M., Mfg. Co., Cinn., Ohio.
Standard Machinery Co., Auburn, R. I.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Toledo Mach. & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Roofing and Corrugating

Streine Tool & Mfg. Co., The, New Bremen, O.

PRESSES—Scrap Bundling

Standard Machinery Co., Auburn, R. I.

PRESSES—Sub

Blake & Johnson Co., Waterbury, Ct.
U. S. Tool Co., Inc., The, Ampere, N. J.

PRESSES—Trimming

Chambersburg Engrg. Co., Chambersburg, Pa.
Peck, Stow & Wilcox Co., Southington, Ct.

PRESSES—Wheel

Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
French Oil Mill Mchry. Co., Piqua, Ohio.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

PULLEYS—Friction Clutch

Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 5th St., Cincinnati, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

PULLEYS—Iron, Solid and Split

Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Falls Clutch & Mchry. Co., Cuyahoga Falls, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Medart Company, The, St. Louis, Mo.

PULLEYS—Magnetic

Dings Magnetic Separator Co., Milwaukee, Wis.

PULLEYS—Steel, Rim Solid and Split

American Pulley Co., Philadelphia, Pa.
Hyman, Joseph, & Sons, Philadelphia, Pa.

PULVERIZED COAL EQUIPMENT

Bethlehem Steel Co., Bethlehem, Pa.
Combustion Engineering Corp., 43 Broad St., New York City.

PULVERIZERS—Coal

American Pulverizer Co., St. Louis, Mo.

PUMPS—Boiler Feed

Denn Bros. Co., Indianapolis, Ind.
Deming Co., The, Salem, Ohio.
Ingersoll-Rand Co., (Cameron) 11 B'way, New York City.
Lecourtenay Co., Newark, N. J.
Manistee Iron Works Co., Manistee, Mich.
Morris Machine Works, Baldwinville, N. Y.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Centrifugal

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., 492 B'way, Buffalo, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Frederick Iron & Steel Co., Frederick, Md.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Ingersoll-Rand Co., (Cameron), 11 Broadway, New York City.
Lecourtenay Co., Newark, N. J.
Manistee Iron Works Co., Manistee, Mich.
Morris Mach. Works, Baldwinville, N. Y.
Nat'l Transit Pump & Mch. Co., Oil City, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Electric

Deming Co., The, Salem, Ohio.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Myers, F. H., & Bro. Co., Ashland, O.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Hand and Power

Deming Co., The, Salem, Ohio.
Myers, F. H., & Bro. Co., Ashland, O.

PUMPS—Hydraulic

Bethlehem Steel Co., Bethlehem, Pa.
Dean Bros. Co., Indianapolis, Ind.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.
Worthington Pump & Mchry. Corp., 115 B'way,
New York City.

PUMPS—Pneumatic Air Lift

Ingersoll-Rand Co., 11 B'way, N. Y. C.
Sullivan Machinery Co., Chicago, Ill.

PUMPS—Rotary

Connorsville Blower Co., Connorsville, Ind.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Roots, P. H. & F. M., Co., Connorsville, Ind.

PUMPS—Steam

American Steam Pump Co., Battle Creek,
Mich.
Ingersoll-Rand Co. (Cameron), 11 Broadway,
New York City.
Ullman, Jacob, Buffalo, N. Y.
Worthington Pump & Mchry. Corp., 115 B'way,
New York City.

PUMPS—Vacuum

Bury Compressor Co., Erie, Pa.
Ingersoll-Rand Co., 11 B'way, New York City.
Sullivan Machinery Co., Chicago, Ill.
Worthington Pump & Mchry. Corp., 115 B'way,
New York City.

PUNCHES—Pneumatic

Hanna Engineering Wks., Chicago, Ill.

PUNCHES AND DIES

Cleveland Punch & Shear Wks. Co., Cleve., O.
Cleveland Steel Tool Co., Cleveland, Ohio.
Marchant, Geo. F., Co., Chicago, Ill.

PUNCHING AND SHEARING MACHINES

Armstrong-Mum Mfg. Co., Chicago, Ill.
Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Buffalo Forge Co., 402 B'way, Buffalo, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Consolidated Mach. Tool Corp. of America,
Wilmington, Del.
Hendley & Whittemore Co., Beloit, Wis.
Lake Erie Engineering Corp., Buffalo, N. Y.
Loshbough-Jordan Tool & Mch. Co., Elkhart,
Ind.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Niagara Machine & Tool Works, Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Southwark Fdry. & Mch. Co., Phila., Pa.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Wickes Brothers, Saginaw, Mich.
Williams, White & Co., Moline, Ill.

PURIFIERS—Oil

De Laval Steam Turbine Co., Trenton, N. J.

PYROMETERS

Bristol Co., Waterbury, Ct.
Hoskins Mfg. Co., Detroit, Mich.
Wilson-Maculen Co., Inc., 738 E. 148d St.,
New York City.

RAIL BONDS

American Steel & Wire Co., Chicago, Ill.

RAIL SPICE BARS

Ames, W., & Co., Jersey City, N. J.

RAILS

Briddell, W. C., Co., Inc., Baltimore, Md.
Cohen, Louis, & Son, Wilkes-Barre, Pa.
Continental Iron & Steel Co., 33 Rector St.,
New York City.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Frank, M. R., Pittsburgh, Pa.
Green, L. A., Railway Equipment Co., Pitts-
burgh, Pa.
Hyman-Michaels Co., Chicago, Ill.
Illinois Steel Co., Chicago, Ill.
Lindheimer, S. W., Chicago, Ill.
Luria Bros. & Co., Inc., Woolworth Bldg.,
New York City.
Morrison & Risman Co., Inc., The, Buffalo,
N. Y.
Richardson & Co., Inc., Pittsburgh, Pa.
Robinson & Orr, Pittsburgh, Pa.
Sherwood, E. C., 50 Church St., New York,
N. Y.
Sonken-Galamba Corp., Kansas City, Kan.
Tenn. Coal, Iron & R.I. Co., Birmingham, Ala.
Waldo, Egbert & McClain, Buffalo, N. Y.

RAILWAY EQUIPMENT AND SUPPLIES

Briddell, W. C., Co., Inc., Baltimore, Md.
Continental Iron & Steel Co., 33 Rector St.,
N. Y. C.
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Hyman-Michaels Co., Chicago, Ill.
Morrison & Risman Co., Inc., The, Buffalo,
N. Y.
Pidgeon-Thomas Iron Co., Memphis, Tenn.
Track Specialties Co., 29 Broadway, N. Y. C.
Waldo, Egbert & McClain, Buffalo, N. Y.

REAMERS—Adjustable and Expansion

Brown-McLaren Mfg. Co., Detroit, Mich.
Brubaker, W. L., & Bros. Co., 50 Church St.,
New York City.
Buckeye Twist Drill Co., The, Alliance, O.
Cleveland Twist Drill Co., Cleveland, O.
McCrosky Tool Corp., Meadville, Pa.
Millersburg Renner & Tool Co., Millersburg,
Pa.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.
Union Twist Drill Co., Athol, Mass.

REFLECTORS—Lamp

Hubbell, Harvey, Inc., Bridgeport, Ct.

REINFORCING METAL FOR CONCRETE WORK

Truscon Steel Co., Youngstown, O.

RESPIRATORS AND GAS MASKS

Safety Equip. Service Co., Cleveland, O.

RETAINERS—Ball

Bearings Co. of America, The, Lancaster, Pa.

RETAINING WALLS—Precast

R. C. Products Co., Cleveland, Ohio.

RIDDLES—Foundry

Beardsley & Piper Co., Chicago, Ill.
Ludlow-Saylor Wire Co., 600-610 Newstead
Ave., St. Louis, Mo.

RINGS—Forged

Jersey Forging Wks., Jersey City, N. J.

RINGS—Iron or Steel

Geneva Metal Wheel Co., 145 Railroad St.,
Geneva, O.
Milwaukee Forge & Mch. Co., Milwaukee, Wis.

RIVET CUTTING GUNS

Rivet Cutting Gun Co., Cincinnati, O.

RIVET MAKING MACHINERY

Acme Machinery Co., Cleveland, O.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Machry. Co., Tiffin, O.

RIVET SETS AND STANDS

Chicago Pneumatic Tool Co., 6 East 44th St.,
New York City.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Cleveland Steel Tool Co., Cleveland, Ohio.
Hunter Saw & Machine Co., 5600 Butler St.,
Pittsburgh, Pa.
Marchant, Geo. F., Co., Chicago, Ill.

RIVETING MACHINES

Allen, John F., Co., 372 Gerard Ave., N. Y. C.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hanna Engrg. Works, Chicago, Ill.
Shuster, P. H., Co., New Haven, Ct.
Wood, R. D., & Company, Philadelphia, Pa.

RIVETS

American Screw Co., Providence, R. I.
Bethlehem Steel Company, Bethlehem, Pa.
Clark Bros. Bolt Co., Milldale, Ct.
Hubbell, Harvey, Inc., Bridgeport, Ct.
National Bolt & Nut Company, Pittsburgh, Pa.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Progressive Mfg. Co., Torrington, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.
Rockford Bolt Co., Rockford, Ill.
Russell, Burdall & Co., Ward Bolt & Nut Co.,
Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Townsend Co., New Brighton, Pa.

RIVETS AND BURRS—Copper

Conklin, T. E., Brass & Copper Co., Inc., 54
Lafayette St., New York City.

ROD MILL MACHINERY

Vaughn Machry. Co., Cuyahoga Falls, O.

RODS—Brass, Bronze, Copper or Nickel

Silver
Bridgeport Brass Co., Bridgeport, Conn.
Conklin, T. E., Brass & Copper Co., Inc., 54
Lafayette St., New York City.
Scovill Mfg. Co., Waterbury, Ct.
Seymour Mfg. Co., Seymour, Ct.

RODS—Drill

Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge,
Mass.

RODS—Nickel

Seymour Mfg. Co., Seymour, Ct.

RODS—Phosphor Bronze

Seymour Mfg. Co., Seymour, Ct.

RODS—Welding

Air Reduction Sales Co., 342 Madison Ave.,
New York City.
Wilson Welder & Metals Co., Inc., Wilson
Bldg., Hoboken Factory Terminal, Hoboken,
N. J.

RODS—Welding, Manganese Steel

Manganese Steel Forge Co., Philadelphia, Pa.

RODS—Wire

American Steel & Wire Co., Chicago, Ill.
Fitzsimons Co., Youngstown, Ohio.
Pittsburgh Steel Co., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River,
N. Y. C.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St.,
N. Y. C.

ROLLING MACHINERY—Cold Rolling

Bliss, E. W., Co., 53d St., & 2d Ave., Brook-
lyn, N. Y.
Kane & Roach, Syracuse, N. Y.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Streine Tool & Mfg. Co., The, New Bremen, O.
Yoder Co., The, Cleveland, O.

ROLLING MACHINERY—Corrugating

Streine Tool & Mfg. Co., The, New Bremen, O.

ROLLING MACHINES—Sheet Metal

Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Streine Tool & Mfg. Co., The, New Bremen, O.

ROLLING MILL MACHINERY

Birdsboro Steel Fdry. & Mch. Co., Birdsboro,
Pa.
Blake & Johnson Co., Waterbury, Ct.

Bliss, E. W., Co., 53d St., & 2d Ave., Brook-
lyn, N. Y.

Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Philadelphia Roll & Mach. Co., Phila., Pa.
Standard Engineering Co., Ellwood City, Pa.
Standard Machinery Co., Auburn, R. I.
Treadwell Engineering Co., Easton, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Waterbury-Farrel Fdry. & Machine Co., Water-
bury, Ct.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

ROLLS—Alloy Steel

Pittsburgh Rolls Corp., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

ROLLS—Bending and Straightening

Bertsch & Co., Cambridge City, Ind.
Bethlehem Steel Company, Bethlehem, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Consolidated Mach. Tool Corp. of America,
Wilmington, Del.
Hendley & Whittemore Co., Beloit, Wis.
Lake Erie Engineering Corp., Buffalo, N. Y.
McCabe, J. J., Lathe & Machry. Corp., 149
Broadway, New York City.
McCabe & Sheeran Mchry. Corp., Room 482,
50 Church St., New York City.
Marshalltown Mfg. Co., Marshalltown, Ia.
Niagara Machine & Tool Works, Buffalo, N. Y.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Southwark Foundry & Machine Co., Phila., Pa.
Wickes Brothers, Saginaw, Mich.

ROLLS—Sand Chilled and Steel

American Steel Foundries, Chicago, Ill.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro,
Pa.

Hyde Park Fdry. & Mch. Co., Hyde Park, Pa.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Philadelphia Roll & Mach. Co., Phila., Pa.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Standard Engineering Co., Ellwood City, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

ROLLS—Special Hardened

Bethlehem Steel Company, Bethlehem, Pa.

ROOFING—Cement Tile

American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.

ROOFING—Concrete

Austin Co., The, Cleveland, Ohio.

ROOFING AND SIDING—Corrugated and Plain

American Sheet & Tin Plate Co., Pitts., Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
United Alloy Steel Corp., Canton, Ohio.

ROOFING AND SIDING—Iron and Steel

Newport Rolling Mill Co., Newport, Ky.
United Alloy Steel Corp., Canton, Ohio.

RUST PREVENTATIVES

American Chemical Paint Co., Ambler, Pa.
Oakley Chemical Co., 22 Thames St., N. Y. C.

RUST REMOVING

American Chemical Paint Co., Ambler, Pa.
Nukem Products Corp., 93 Raper St., Buffalo,
N. Y.

SAFETY DEVICES—Power Press

Wiesman Mfg. Co., Dayton, Ohio.

SAFETY DEVICES AND SUPPLIES

Safety Equip. Service Co., Cleveland, O.
Weldit Acetylene Co., Detroit, Mich.

SAND—Molding

Pettinos, Geo. F., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East
40th Street, New York City.

SAND—Sand Blast

Beardsley & Piper Co., Chicago, Ill.
Cape May Sand Co., Cape May, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Pettinos, Geo. F., Philadelphia, Pa.
Portage Silica Co., The, Youngstown, O.
U. S. Silica Co., Chicago, Ill.

SAND—Silica

U. S. Silica Co., Chicago, Ill.

SAND—Steel Molding

Cape May Sand Co., Cape May, N. J.
Portage Silica Co., The, Youngstown, O.

SAND BLAST EQUIPMENT & MACHINES

American Fdry. Equip. Co., Mishawaka, Ind.
Arcade Mfg. Co., Freeport, Ill.
Beardsley & Piper Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Mott Sand Blast Mfg. Co., Inc., Chicago, Ill.
Pangborn Corporation, Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co., Cleveland, O.

SAND BLAST SHOT AND GRIT

Pangborn Corporation, Hagerstown, Md.

**SAND CUTTING AND SCREENING MA-
CHINES**

American Fdry. Equip. Co., Mishawaka, Ind.
Beardsley & Piper Co., Chicago, Ill.

SAND HANDLING EQUIPMENT

Bartlett, C. O., & Snow Co., Cleveland, O.
Beardsley & Piper Co., Chicago, Ill.
National Engineering Co., Chicago, Ill.

SAND MILLS

National Engineering Co., Chicago, Ill.

SAND RAMMERS

Beardsley & Piper Co., Chicago, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St.,
New York City.
Ingersoll-Rand Co., 11 Eway, N. Y. C.

SAND RECLAIMERS

Beardsley & Piper Co., Chicago, Ill.

SAND SIFTERS

Beardsley & Piper Co., Chicago, Ill.

SANDING BELTS

Divine Brothers Co., Utica, N. Y.

SANDING WHEELS

Divine Brothers Co., Utica, N. Y.

SASH OPERATING DEVICES

Trucon Steel Co., Youngstown, O.

SASH—Steel

Trucon Steel Co., Youngstown, Ohio.

SAWING MACHINES—Band for Wood or Metal

Diamond Saw & Stamping Wks., Buffalo, N. Y.
Stockbridge Mch. Co., Worcester, Mass.
Thompson, Henry G., & Son Co., The, New
Haven, Conn.

SAWING MACHINES—Metal

Earle Gear & Mch. Co., Philadelphia, Pa.
Espan-Lucas Mach. Works, Philadelphia, Pa.

SAWS—Bands for Metal

Armstrong-Blum Mfg. Co., Chicago, Ill.
Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Starrett, L. S., Co., The, Athol, Mass.
Thompson, Henry G., & Son Co., The, New
Haven, Conn.

SAWS—Circular Metal

Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St.,
Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Cold Metal

Dieston, Henry, & Sons, Inc., Philadelphia, Pa.

SAWS—Friction

Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SAWS—Hack Saw Blades

Darwin & Milner, Inc., Cleveland, Ohio.
Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Peerless Machine Co., Racine, Wis.
Thompson, Henry G., & Son Co., The, New
Haven, Conn.

SAWS—Hot Metal

Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St.,
Pittsburgh, Pa.

SAWS—Inserted Tooth, Cold

Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St.,
Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Screw Slotting

Dieston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Sliding Frame

United Engrg. & Fdry. Co., Pittsburgh, Pa.

SCRAP—Iron and Steel

Briddell, W. C., Co., Inc., Baltimore, Md.
Leaf, E. B., Co., Philadelphia, Pa.
Luria Bros. & Co., Inc., Woolworth Bldg.,
New York City.
Perry, Buxton Doane Co., Boston, Mass.
Potts, Henry, & Co., Philadelphia, Pa.

SCRAP METAL—Non-Ferrous

Smith, Morton B., Co., 243 Front St., N. Y. C.

SCREENS—Perforated Metal

Chicago Perforating Co., Chicago, Ill.
Cross Engineering Co., Carbondale, Pa.
Erdie Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, Jersey City, N. J.
Remaly Mfg. Company, Tamaqua, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St.,
N. Y. C.

SCREENS—Vibrating

Link-Belt Co., Chicago, Ill.

SCREENS—Woven Wire

Ladlow-Saylor Wire Co., 600-610 Newstead
Ave., St. Louis, Mo.
Manganese Steel Forge Co., Philadelphia, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St.,
N. Y. C.

SCREW DRIVERS—Portable Electric

U. S. Electrical Tool Co., Cincinnati, Ohio.

SCREW MACHINE PRODUCTS

Barnes, Wallace, Co., The, Bristol, Ct.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Blake & Johnson Co., Waterbury, Ct.
Bridgeport Brass Co., Bridgeport, Conn.
Brown Bag Filling Machine Co., The, Fitch-
burg, Mass.
Brown-McLaren Mfg. Co., Detroit, Mich.
Clark, Cadie Harmon Corp., Rochester, N. Y.
Cleveland Cap Screw Co., The, Cleveland, O.
Corbin Screw Corp., New Britain, Ct.
Eastern Mch. Screw Corp., New Haven, Conn.
Ericsson Screw Mach. Prod. Co., Inc., 610
Bergen St., Brooklyn, N. Y.

Hartford Machine Screw Co., Hartford, Conn.
Machinery Products Corp., Chicago, Ill.
Michigan Screw Company, Lansing, Mich.
National Acme Co., Cleveland, Ohio.
Newton Mfg. Co., Plainville, Ct.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Penn Screw & Machine Works, Phila., Pa.
Progressive Mfg. Co., Torrington, Ct.
Scovill Mfg. Co., Waterbury, Ct.
Screw Machine Products Corp., Providence, R. I.
Sherwood Mfg. Co., Buffalo, N. Y.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Torrington Co., Torrington, Ct.
Wahl Co., The, Chicago, Ill.
Warner Brothers Co., Bridgeport, Ct.
Western Screw Products Co., St. Louis, Mo.
Wright Machine Company, Worcester, Mass.

SCREW MACHINERY—Automatic

Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., Cleveland, Ohio.

SCREW MACHINERY—Automatic Wood

Cook, Asa S., Co., Hartford, Ct.

SCREW MACHINERY—Hand

Jones & Lawson Mch. Co., Springfield, Vt.

SCREW MACHINERY—Multiple Spindle

Acme Machine Tool Company, Cincinnati, O.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., Cleveland, Ohio.

SCREW MACHINERY—Second-Hand

Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.

SCREW PLATES

Greenfield Tap & Die Corp., Greenfield, Mass.

SCREWS—Cap

Clark Bros. Bolt Co., Milldale, Ct.
Cleveland Cap Screw Co., The, Cleveland, O.
Corbin Screw Corp., New Britain, Ct.
Hartford Machine Screw Co., Hartford, Conn.
National Acme Co., Cleveland, Ohio.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Reed & Prince Mfg. Co., Worcester, Mass.
Scovill Mfg. Co., Waterbury, Ct.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleve-
land, O.

SCREWS—Coach and Lag

Pawtucket Mfg. Co., Pawtucket, R. I.

SCREWS—Cold Headed

Cleveland Cap Screw Co., The, Cleveland, O.

SCREWS—Machine

American Screw Co., Providence, R. I.
Blake & Johnson Co., Waterbury, Ct.
Brown-McLaren Mfg. Co., Detroit, Mich.
Corbin Screw Corp., New Britain, Ct.
Ericsson Screw Mach. Prod. Co., Inc., 610
Bergen St., Brooklyn, N. Y.
Hubbell, Harvey, Inc., Bridgeport, Ct.
Progressive Mfg. Co., Torrington, Ct.
Reed & Prince Mfg. Co., Worcester, Mass.
Scovill Mfg. Co., Waterbury, Ct.
Warner Brothers Co., Bridgeport, Ct.

SCREWS—Safety Set

Allen Mfg. Co., The, Hartford, Ct.
Bristol Co., Waterbury, Ct.
Hartford Mach. Screw Co., Hartford, Ct.
Progressive Mfg. Co., Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleve-
land, O.

SCREWS—Set

Ericsson Screw Mach. Prod. Co., Inc., 610
Bergen St., Brooklyn, N. Y.
Hartford Mach. Screw Co., Hartford, Ct.
National Acme Co., Cleveland, Ohio.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleve-
land, O.

SCREWS—Wood

American Screw Co., Providence, R. I.
Bridgeport Screw Co., Bridgeport, Ct.

SECOND-HAND MACHINERY—See Clearing House Section

Adams, Ogden R., Co., Inc., Rochester, N. Y.
Allen, H. F., Co., Inc., 50 Church St.,
New York City.
American Ship Building Co., Cleveland, O.
Bath, Cyril J., & Co., Cleveland O.
Bennett Mchry. Co., 30 Church St., N. Y. C.
Bertelette Mch. Tool Co., Inc., Jersey City,
N. J.
Botwinik Bros., Inc., New Haven, Conn.
Brearley, H. P., 90 West St., New York City.
Briggs, Marvin, Inc., 167 Sixth St., Brooklyn,
N. Y.
Calleson, C. A., 50 Church St., New York City.
Carle Mchry. Co., 500 E. Woodbridge St.,
Detroit, Mich.
Central Equipment Co., Detroit, Mich.
Crane-Schleifer-Owens, Inc., Buffalo, N. Y.
Crawford, F. H., & Co., Inc., 50 Church St.,
New York City.
Donahue Steel Prod. Co., Chicago, Ill.
Duff Machinery Corp., 250 Park Ave., N. Y. C.
Eastern Machinery Co., Cincinnati, Ohio.
Emmerman, Louis E., & Co., Chicago, Ill.
Essley, E. J., Mchry. Co., Chicago, Ill.
Factory & Mill Supply Co., Boston, Mass.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, 647 W. Wash-
ington Blvd., Chicago, Ill.
Hitner's, Henry A., Sons Co., Philadelphia,
Pa.
Ideal Machinery Co., Plainville, Conn.
International Mchry. Co., Detroit, Mich.
Johnson, Wm. C., & Sons, Mchry. Co., St.
Louis, Mo.
Jones Machine Tool Co., Cincinnati, O.

Lamberg, A., & Co., 241 Centre St., N. Y. C.
Larkin, M. D., Co., Dayton, O.
Liberty Pattern Works, Rochester, N. Y.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
Lynd-Farquhar Co., Boston, Mass.
McCabe, J. J., Lathe & Mchry. Corp., 149
Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482,
50 Church St., New York City.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.
Machinery Dealers, Inc., New Haven, Conn.
Mid-West Mch. Tool & Supply Co., Davenport,
Iowa.
Miles Mchry. Co., Saginaw, W. S. Mich.
Morey & Co., Inc., 410 Broome St., N. Y. C.
Niles, F. H., & Co., Inc., Woolworth Bldg.,
New York City.
Nilson, A. H., Mch. Co., Bridgeport, Ct.
O'Brien Mchry. Co., Philadelphia, Pa.
Osborne & Sexton Mchry. Co., Columbus, O.
Power Machinery, Inc., Jersey City, N. J.
Prentiss, Henry, & Co., Inc., 149 Broadway,
New York City.
Prussian, M., Mchry. Co., Detroit, Mich.
Randie Mchry. Co., Cincinnati, Ohio.
Reliance Mchry. Sales Co., Pittsburgh, Pa.
Riverside Mchry. Depot, Detroit, Mich.
Russell Machine Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Severin-Tripp Mchry. Co., 25 Church St.,
New York City.
Simmons Mach. Tool Corp., Albany, N. Y.
Stocker-Rumely-Wachs Co., Chicago, Ill.
Strafer, A. F., 30 Church St., New York City.
Sun Mchry. Co., Inc., Newark, N. J.
Ullman, Jacob, Buffalo, N. Y.
White, A. D., Mchry. Co., Chicago, Ill.
Wickes Machinery Co., Jersey City, N. J.

SEPARATORS—Magnetic

Dings Magnetic Separator Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

SEPARATORS—Oil from Chips

Ideal Concrete Machry. Co., Cincinnati, O.

SHAFTING—Cold Drawn

Bethlehem Steel Company, Bethlehem, Pa.
Keystone Drawn Steel Co., Spring City, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTING—Cold Rolled

Timken Roller Bearing Co., Canton, O.

SHAFTING—Flexible

Fischer, Chas., Spring Co., 240 Kent Ave.,
Brooklyn, N. Y.
Stow Mfg. Co., Inc., Binghamton, N. Y.

SHAFTING—Steel

Timken Roller Bearing Co., Canton, O.
Ullman, Jacob, Buffalo, N. Y.

SHAFTING—Tubular Material for

National Tube Co., Pittsburgh, Pa.

SHAFTING—Turned and Polished

Fitzsimmons Co., Youngstown, Ohio.
Medart Co., The, St. Louis, Mo.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTS—Forged

Jersey Forging Wks., Jersey City, N. J.

SHAPES—Cold Drawn

Keystone Drawn Steel Co., Spring City, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAPES—Cold Rolled

Metal Forming Corp., Elkhart, Ind.

SHAPES—Steel

Phoenix Iron Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SHAPING MACHINES—Horizontal

American Tool Works Co., Cincinnati, O.
Cincinnati Shaper Co., The, Cincinnati, O.
Columbia Mch. Tool Co., The, Hamilton,
Ohio.
Gould & Eberhardt, Newark, N. J.
Kelly, R. A., Co., The, Xenia, Ohio.
Ohio Machine Tool Co., Kenton, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Smith & Mills Company, Cincinnati, O.
Stockbridge Machine Co., Worcester, Mass.

SHEAR BLADES

Heppenstall Forge & Knife Co., Pitts., Pa.
Pittsburgh Knife & Forge Co., Coraopolis, Pa.
Wapakoneta Machine Company, Wapakoneta, O.

SHEARING MACHINES—Alligator

Canton Fdry. & Mch. Co., Canton, O.
Doelger & Kirsten, 3105 Chambers St., Mil-
waukee, Wis.
Hendley & Whittemore Co., Beloit, Wis.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES—Automatic Alligator

Doelger & Kirsten, 3105 Chambers St., Mil-
waukee, Wis.

SHEARING MACHINES—Bar

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Standard Engineering Co., Ellwood City, Pa.

SHEARING MACHINES—Billet

Morgan Engineering Co., Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES—Doubling and Squaring

Streffes Tool & Mfg. Co., The, New Bremen, O.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES—Metal Slitting

Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Hendley & Whittemore Co., Beloit, Wis.
Streine Tool & Mfg. Co., The, New Bremen, O.

SHEARING MACHINES—Metal Slitting Gang

Adriance Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.
Yoder Co., The, Cleveland, O.

SHEARING MACHINES—Plate

Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Punch & Shear Wks., Cleveland, O.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Ct.
Marshalltown Mfg. Co., Marshalltown, Ia.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Ct.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Streine Tool & Mfg. Co., The, New Bremen, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Wood, R. D., & Company, Philadelphia, Pa.

SHEARING MACHINES—Rotary for Irregular Cutting

Lake Erie Engineering Corp., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SHEARING MACHINES—Sheet, Automatic

Streine Tool & Mfg. Co., The, New Bremen, O.

SHEET BARS

Andrews Steel Co., Newport, Ky.

SHEET METAL MACHINERY

Adriance Machine Works, Inc., 82 Richards St., Brooklyn, N. Y.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Drels & Krump Mfg. Co., Chicago, Ill.
Kane & Roach, Syracuse, N. Y.
Lefter, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Conn.
Niagara Machine & Tool Works, Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Ct.
Robinson, J. M., Mfg. Co., Cincinnati, O.
Streine Tool & Mfg. Co., The, New Bremen, O.
Standard Machinery Co., Auburn, R. I.
Toledo Machine & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Yoder Co., The, Cleveland, O.

SHEETS—Aluminum

Erdle Perforating Co., Rochester, N. Y.

SHEETS—Auto Body

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS—Black

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Co., The, Massillon, O.
Inland Steel Company, Chicago, Ill.
Michigan Steel Corp., Ecorse, Detroit, Mich.
Newton Steel Co., Youngstown, O.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS—Blue Annealed

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Central Steel Company, The, Massillon, O.
Eddystone Steel Co., Crum Lynne, Pa.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Wood, Alan, Iron & Steel Co., Phila., Pa.

SHEETS—Brass, Bronze, Copper or Nickel Silver

Bridgeport Brass Co., Bridgeport, Conn.
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
Copper & Brass Research Assn., 25 B'way, New York City.
Seymour Mfg. Co., Seymour, Conn.

SHEETS—Electrical

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pitts., Pa.
Central Steel Co., The, Massillon, O.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Enameling Stock

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Newton Steel Co., Youngstown, O.

Seneca Iron & Steel Co., Buffalo, N. Y.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—For Drawing and Stamping

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Steel Company, The, Massillon, O.
Columbia Steel Co., Pittsburgh, Pa.
Firth-Sterling Steel Co., Atchafalpa, Pa.
Michigan Steel Corp., Ecorse, Detroit, Mich.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Full Finished

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Galvanized, Flat and Corrugated

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Corp., San Francisco, Cal.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Co., The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Weirton Steel Co., Weirton, W. Va.

SHEETS—Metal Furniture

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Phosphor Bronze

Bridgeport Brass Co., Bridgeport, Conn.
Phosphor Bronze Smelting Co., Phila., Pa.
Seymour Mfg. Co., Seymour, Ct.

SHELVING—Steel

Cleveland Wire Spring Co., Cleveland, O.
United Alloy Steel Corp., Canton, O.

SHIM STEEL

Pittsburgh Cold Rolled Steel Co., Verona, Pa.

SHIP BUILDERS' MATERIAL

Bethlehem Steel Company, Bethlehem, Pa.

SHOT FOR SAND BLAST—See Sand Blast Shot and Grit**SHOVELS—Gasoline**

Brown Hoisting Mehry, Co., Cleveland, O.

SHUTTERS—Steel and Wood Bi-Folding

Kinnear Mfg. Co., Columbus, O.

SIGNS—Safety and Danger

Safety Equip. Service Co., Cleveland, O.

SILICON—Refined

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SKIM GATES

Sterling Wheelbarrow Co., Milwaukee, Wis.

SLABS

Andrews Steel Co., Newport, Ky.
Columbia Steel Co., Pittsburgh, Pa.

SLABS—Cement Roofing

Federal Cement Tile Co., Chicago, Ill.

SLEEVES—Axle, Automobile and Truck

Timken Roller Bearing Co., Canton, Ohio.

SLINGS—Wire Rope

American Cable Co., Inc., 105 Hudson St., N. Y. C.
Roebeling's, John A., Sons Co., Trenton, N. J.

SLOTING MACHINES

Consolidated Mach. Tool Corp. of America, Wilmington, Del.
Nazel Engrg. & Mch. Wks., Philadelphia, Pa.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

SOCKETS—Wire Rope

Chicago Steel Fdry. Co., Chicago, Ill.

SPACING TABLES—Punching and Shearing

Thomas Spacing Machine Co., Pittsburgh, Pa.

SPECIAL MACHINERY

Automatic Machine Co., The, Bridgeport, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Bullard Machine Tool Co., Bridgeport, Ct.
Columbia Mch. Tool Co., The, Hamilton, Ohio.
Cook, Asa S., Co., Hartford, Ct.
Crowder, C. H., Machine Works, 30 Summer St., Fitchburg, Mass.
Doelger & Kirsten, 3105 Chambers St., Milwaukee, Wis.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Fawcens Mach. Co., Pittsburgh, Pa.
Hartford Special Machinery Co., The, Hartford, Ct.
Lefter, Charles & Co., 61 Clymer St., Brooklyn, N. Y.
Littell, F. J., Mach. Co., Chicago, Ill.
Manville, E. J., Machine Co., Waterbury, Ct.
Mehl Machine Tool & Die Co., Roselle, N. J.

Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Treadwell Engineering Co., Easton, Pa.
York Electric & Mach. York, Pa.

SPEED REDUCERS

Albaugh-Dover Mfg. Co., Chicago, Ill.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Cleveland Worm & Gear Co., Cleveland, O.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

SPIKES

American Steel & Wire Co., Chicago, Ill.
Ames, W., & Co., Jersey City, N. J.
Bethlehem Steel Company, Bethlehem, Pa.
Foster, L. B., Co., Inc., Pittsburgh, Pa.

SPRING MAKING MACHINERY

Baird Machine Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS—Car

American Steel & Wire Co., Chicago, Ill.

SPRINGS—Wire, Coil or Flat

Advance Spring & Wire Co., Chicago, Ill.
American Spring & Mfg. Corp., Holley, Mich.
American Steel & Wire Co., Chicago, Ill.
Barnes-Gibson-Raymond, Inc., Detroit, Mich.
Barnes, Wallace, Co., The, Bristol, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Cleveland, O.
Dunbar Bros. Co., Bristol, Ct.
Everitt Co., The, Boston, Mass.
Fischer, Chas., Spring Co., 240 Kent Ave., Brooklyn, N. Y.
Gibson, Wm. D., Co., Chicago, Ill.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Lee Spring Company, Inc., 30 Main St., Bklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Newcomb Spring Corp., 234 40th St., Brooklyn, N. Y.
Peterson Spring Co., Detroit, Mich.
Raymond Mfg. Co., Corry, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

SPROCKETS

American High Speed Chain Co., Indianapolis, Ind.
Cullman Wheel & Co., Chicago, Ill.
Dundore Mfg. Co., Reading, Pa.
Link-Belt Co., Chicago, Ill.
Union Chain & Mfg. Co., Sandusky, O.

STACKS—Steel

Chicago Bridge & Iron Works, Chicago, Ill.
Hendrick Manufacturing Co., Carbondale, Pa.

STAMPINGS OR DRAWINGS—Metal

Accurate Metal Stamping Co., Inc., 138 Liberty St., New York City.
Acme Stg. & Mfg. Co., Pittsburgh, Pa.
Akron-Selle Co., Akron, Ohio.
American Pulley Co., Philadelphia, Pa.
American Spring & Mfg. Corp., Holley, Mich.
American Tube & Stg. Co., Bridgeport, Conn.
Barnes, Wallace, Co., The, Bristol, Ct.
Bay State Stamping Co., Worcester, Mass.
Bettcher Stamping & Mfg. Co., Cleveland, O.
Bossert Corp., The, Utica, N. Y.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Ct.
Burgess-Norton Mfg. Co., Geneva, Ill.
Central Iron & Steel Co., Harrisburg, Pa.
Cook, H. C., Co., Ansonia, Conn.
Crosby Co., The, Buffalo, N. Y.
Cuyahoga Spring Co., Cleveland, O.
Detroit Stamping Co., Detroit, Mich.
Douglas & Lomason Co., Detroit, Mich.
Eastern Tool & Stg. Co., Inc., Saugus, Mass.
Erdle Perforating Co., Rochester, N. Y.
G. G. Metal Stg. Co., Dept. A., Warren, Pa.
General Machine & Mfg. Co., The, Bridgeport, Conn.
Gunder, Paeschke & Frey Co., (Contract Mfg. Division), Milwaukee, Wis.
Globe Mach. & Stg. Co., Cleveland, O.
Gray, Peter, & Sons, Inc., Cambridge, Mass.
Great Lakes Pressed Steel Corp., Buffalo, N. Y.
Harry Brothers Mfg. Co., Detroit, Mich.
Helms Mfg. Co., Philadelphia, Pa.
Holmes Special Tool Co., New Haven, Conn.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Jahn, B., Mfg. Co., The, New Britain, Conn.
Jenkinson, R. C., & Co., Newark, N. J.
Kirby Mfg. Co., The, Middletown, Ct.
Konigslow, E., Stamping & Tool Co., The, Cleveland, O.
Konigslow, Otto, Mfg. Co., Cleveland, O.
Lansing Stg. Co., Lansing, Mich.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Matthews Mfg. Co., Worcester, Mass.
Metal Specialty Co., Cincinnati, O.
Motor Wheel Corp., Lansing, Mich.
National Marine Lamp Co., Forestville, Conn.
National Umbrella Frame Co., Philadelphia, Pa.
New England Pressed Steel Co., Natick, Mass.
Pocono Metal Mfg. Co., East Stroudsburg, Pa.
Robinson Tool Works, Inc., Waterbury, Conn.
Rome Mfg. Company, Rome, N. Y.
Root Co., Bristol, Conn.
Scovill Mfg. Co., Waterbury, Ct.
Sessions, J. H., & Son, Bristol, Ct.
Sexton Can Company, Inc., Everitt, Mass.
Sheet Metal Prod. Co., The, Kansas City, Mo.
Shelton Novelty Co., Derby, Conn.
Superior Metal Products Co., Elvira, O.
Torrington Co., Torrington, Ct.
Tranane & Williams Steel Forging Corp., Alliance, O.

Truscon Steel Co., Youngstown, O.
Tucker, M., & Co., Philadelphia, Pa.
Warner Brothers Co., Bridgeport, Ct.
Wheeler Radiator & Mfg. Co., The, Cleveland, Ohio.
Worcester Stamped Metal Co., Worcester, Mass.

STAMPS—Steel Alphabets and Figures
Schwerdtle Stamp Co., Bridgeport, Ct.

STANDPIPES
Lancaster Iron Works, Inc., Lancaster, Pa.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STAPLES
American Steel & Wire Co., Chicago, Ill.

STARS—Tumbling Mill
Canton Malleable Iron Co., Canton, Ohio.

STEEL—Alloy
Allen, Edgar, Steel Company, Chicago, Ill.
Atlas Steel Corp., Dunkirk, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Company, The, Massillon, O.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Hawkrider Bros. Company, Boston, Mass.
Interstate Iron & Steel Co., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons Co., 91 John St., N. Y. C.
Ludlum Steel Co., Watervliet, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
Timken Roller Bearing Co., Canton, O.
United Alloy Steel Corp., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Union Drawn Steel Company, Beaver Falls, Pa.

STEEL—Bright Finished
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Carbon
Carnegie Steel Co., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

STEEL—Chrome
Central Steel Company, The, Massillon, O.

STEEL—Chrome Manganese
Wheelock, Lovejoy & Company, Inc., Cambridge, Mass.

STEEL—Chrome Nickel
Andrews Steel Co., Newport, Ky.
Central Steel Company, The, Massillon, O.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

STEEL—Chrome Vanadium
Andrews Steel Co., Newport, Ky.
Central Steel Company, The, Massillon, O.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Cold Drawn
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsmons Co., Youngstown, Ohio.
Globe Wire Company, Sharpsburg, Pa.
Keystone Drawn Steel Co., Spring City, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago, Ill.
American Steel & Wire Co., Chicago, Ill.
American Tube & Stpg. Co., Bridgeport, Ct.
Athenia Steel Co., 135 William St., N. Y. C.
Columbia Steel Co., Pittsburgh, Pa.
Griffin Mfg. Company, Erie, Pa.
Hind Steel Co., Inc., Union, Union County, N. J.
Morris & Bailey Division Oliver Iron & Steel Corp., Pittsburgh, Pa.
National Umbrella Frame Co., Philadelphia, Pa.
Pittsburgh Cold Rolled Steel Co., Verona, Pa.
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.
Stanley Works, New Britain, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Weirton Steel Co., Weirton, W. Va.
West Leechburg Steel Co., Pittsburgh, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

STEEL—Cold Rolled Strips, Nickel Plated
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.

STEEL—Crucible
Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Cutlery
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Firth, Thos., & Sons, Inc., Hartford, Ct.

Jessop Steel Co., Washington, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Die
Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Company, The, Massillon, O.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Dycast Steel Co., Collinsville, Conn.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Drill
Milne, A., & Co., 745 Washington St., N. Y. C.
Stulz-Sickles Co., Newark, N. J.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Ziv Steel & Wire Company, Chicago, Ill.

STEEL—Electric
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkrider Bros. Company, Boston, Mass.
Timken Roller Bearing Co., Canton, Ohio.
United Alloy Steel Corp., Canton, O.

STEEL—High Speed
Allen, Edgar, Steel Company, Chicago, Ill.
Atlas Steel Corp., Dunkirk, N. Y.
Carpenter Steel Company, The, Reading, Pa.
Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkrider Bros. Company, Boston, Mass.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 91 John St., New York City.
Latrobe Electric Steel Co., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago, Ill.
American Tube & Stpg. Co., Bridgeport, Ct.
Barnes, Wallace Co., The, Bristol, Ct.
Central Steel Co., The, Massillon, O.
Griffin Mfg. Company, Erie, Pa.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Laclede Steel Co., St. Louis, Mo.
Sharon Steel Hoop Co., Sharon, Pa.
Stanley Works, New Britain, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
West Leechburg Steel Co., Pittsburgh, Pa.

STEEL—Importers
Jessop, Wm., & Sons, Inc., 91 John St., New York City.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.

STEEL—Magnet
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Lockport, N. Y.

STEEL—Manganese
Era Steel Co., Bucyrus, Ohio.

STEEL—Manganese Rolled or Forged
Manganese Steel Forge Co., Philadelphia, Pa.

STEEL—Nickel
Andrews Steel Co., Newport, Ky.
Central Steel Co., The, Massillon, O.

STEEL—Open Hearth
Driver-Harris Co., Harrison, N. J.
Pacific Coast Steel Co., San Francisco, Cal.
Sharon Steel Hoop Co., Sharon, Pa.
United Alloy Steel Corp., Canton, O.

STEEL—Rustless
Carpenter Steel Company, The, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw
American Steel & Wire Co., Chicago, Ill.
Pittsmons Co., Youngstown, Ohio.
Keystone Drawn Steel Co., Spring City, Pa.
Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Company, Beaver Falls, Pa.

STEEL—Special Analysis
Central Steel Co., The, Massillon, O.
West Leechburg Steel Co., Pittsburgh, Pa.

STEEL—Spring
Athenia Steel Co., 135 William St., N. Y. C.
Barnes, Wallace Co., The, Bristol, Ct.
Bethlehem Steel Company, Bethlehem, Pa.
Central Steel Co., The, Massillon, O.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Patriarche & Bell, 351 West St., N. Y. C.
Pittsburgh Cold Rolled Steel Co., Verona, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

STEEL—Stainless
Allegheny Steel Co., Brackenridge, Pa.
Carpenter Steel Company, The, Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Firth, Thos., & Sons, Inc., Hartford, Ct.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Tool
Allen, Edgar, Steel Company, Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Carpenter Steel Company, The, Reading, Pa.

Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Darwin & Milner, Inc., Cleveland, Ohio.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkrider Bros. Company, Boston, Mass.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 91 John Street, New York City.
Latrobe Electric Steel Co., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
Patriarche & Bell, 351 West St., N. Y. C.
Pittsburgh Cold Rolled Steel Co., Verona, Pa.
Potts, Horace T., & Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
Stulz-Sickles Co., Newark, N. J.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wetherell Bros. Co., Cambridge 39, Mass.
Ziv Steel & Wire Company, Chicago, Ill.

STEEL—Vanadium
Andrews Steel Co., Newport, Ky.
Central Steel Co., The, Massillon, O.

STEEL PLANTS AND ROLLING MILLS
Frey Engineering Co., Chicago, Ill.
McKee, Arthur G., & Co., Cleveland, O.
Perin, C. P.—S. M. Marshall, 40 West 40th St., New York City.

STEEL PLATE CONSTRUCTION
Chicago Bridge & Iron Works, Chicago, Ill.
Cruse-Kemper Co., Ambler, Pa.
Hammond Iron Works, Warren, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Ritter-Conley Company, Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Steel Plate Products Co., Pottstown, Pa.
Tippett & Wood, Phillipsburg, N. J.

STEPS—Ladder and Stair, Non-Slipping
Hendrick Mfg. Co., Carbondale, Pa.

STEPS—Safety
Hendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.

STOCKS AND DIES
Jones & Lamson Mach. Co., Springfield, Vt.
Saunders', D., Sons, Yonkers, N. Y.

STOKERS
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Combustion Engineering Corp., 43 Broad St., New York City.

STOPPERS—Open Hearth, Bessemer or Electric
Ross-Tacony Crucible Co., Philadelphia, Pa.

STOPPERS—Open-Hearth Furnace
McCullough-Dalsell Crucible Co., Pitts., Pa.

STOVES—Hot Blast
Smythe, S. B., Co., Inc., The, Pittsburgh, Pa.

STRAIGHTENING MACHINES
Bliss, E. W., Co., 53d St., & 2d Ave., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Kane & Roach, Syracuse, N. Y.
Medart Company, The, St. Louis, Mo.
Shuster, F. B., Co., New Haven, Conn.
Whitney Metal Tool Co., Rockford, Ill.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co., 71 Broadway, N. Y. C.
Austin Co., The, Cleveland, Ohio.
Belmont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Inc., Berlin, Ct.
Bethlehem Construction Co., Bethlehem, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Morgan Eng. Co., Alliance, O.
New York Central Iron Wks., Co., Inc., Hagerstown, Md.
Phoenix Iron Co., Philadelphia, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Snead Architectural Iron Wks., Louisville, Ky.
Virginia Bridge & Iron Co., Roanoke, Va.

STRUCTURAL IRON WORKS MACHINERY
Espan-Lucas Mach. Works, Philadelphia, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SULPHATE OF IRON
American Steel & Wire Co., Chicago, Ill.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWAGING MACHINES
Etna Machine Co., The, Toledo, O.
Standard Machinery Co., Auburn, R. I.
Torrington Co., Torrington, Ct.

TACKS
American Steel & Wire Co., Chicago, Ill.

TANKS—Compressed Air, Gas, Oil and Water
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Cruse-Kemper Co., Ambler, Pa.
Hamburg Roller Works, Inc., Hamburg, Pa.
Hammond Iron Works, Warren, Pa.
Koven, I. O., & Bro., Inc., Jersey City, N. J.
New York Central Iron Wks., Co., Inc., Hagerstown, Md.

- Petroleum Iron Works Co.,** Sharon, Pa.
Scalfe, Wm. B. & Sons Co., Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Tippett & Wood, Phillipsburg, N. J.
Tudor Boiler Mfg. Co., Cincinnati, O.
- TANKS—Elevated Steel**
 Chicago Bridge & Iron Works, Chicago, Ill.
- TANKS—Elevated Wood**
 Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
- TANKS—Gasoline and Oil**
 Chicago Bridge & Iron Wks., Chicago, Ill.
- TANKS—Iron and Steel**
 Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
 Chicago Bridge & Iron Works, Chicago, Ill.
 Hamburg Boiler Works, Inc., Hamburg, Pa.
 Janney-Steinmets & Co., Philadelphia, Pa.
 Lancaster Iron Works, Inc., Lancaster, Pa.
 Steel Plate Products Co., Pottstown, Pa.
- TANKS—Pickling**
 Hauser-Stander Tank Co., Cincinnati, O.
- TANKS—Rubber Lined**
 Hauser-Stander Tank Co., Cincinnati, O.
- TANKS—Seamless Steel**
 National Tube Co., Pittsburgh, Pa.
- TANKS—Water**
 Hauser-Stander Tank Co., Cincinnati, O.
- TANKS—Welded**
 Air-Tight Steel Tank Co., Pittsburgh, Pa.
 National Tube Co., Pittsburgh, Pa.
- TANKS—Wood**
 Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
 Hauser-Stander Tank Co., Cincinnati, O.
- TAPER PINS**
 Leard, Wm., Co., Inc., New Brighton, Pa.
- TAPPING MACHINES**
 Baker Bros., Inc., Toledo, O.
 Barnes Drill Co., Rockford, Ill.
 National Automatic Tool Co., Richmond, Ind.
 Whitney Metal Tool Co., Rockford, Ill.
- TAPS—Collapsing**
 Landis Machine Co., Inc., Waynesboro, Pa.
 Murchey Mach. & Tool Co., Detroit, Mich.
 National Acme Co., Cleveland, Ohio.
- TAPS AND DIES**
 Brubaker, W. L., & Bros., Company, 50 Church St., New York City.
 Greenfield Tap & Die Corp., Greenfield, Mass.
 Morse Twist Drill & Mch. Co., New Bedford, Mass.
 Pipe Machinery Co., The, Cleveland, O.
- TEES—See Angles, Beams, Channels and Tees**
- TELEGRAPH AND TELEPHONE LINE MATERIAL**
 Oliver Iron & Steel Corp., Pittsburgh, Pa.
- TELEPHONE—Interior**
 Screw Machine Products Corp., Providence, R. I.
- TERNE PLATES**
 American Sheet & Tin Plate Co., Pitts., Pa.
 Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
- THREAD ROLLING MACHINES**
 National Machinery Co., Tiffin, O.
 Nilson, A. H., Mach. Co., Bridgeport, Ct.
 Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.
- TIE PLATES**
 Joliet Wrought Washer Company, Joliet, Ill.
- TIES—Bale**
 American Steel & Wire Co., Chicago, Ill.
- TIES—Creosoted**
 Century Wood Preserving Co., Pittsburgh, Pa.
- TIN PLATE**
 American Sheet & Tin Plate Co., Pitts., Pa.
 Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
 Weirton Steel Co., Weirton, W. Va.
 Wheeling Steel Corp., Wheeling, W. Va.
- TINNERS' TOOLS AND MACHINES**
 Niagara Machine & Tool Works, Buffalo, N. Y.
- TINWARE MACHINERY**
 Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
- TOOL HOLDERS**
 Armstrong Bros., Tool Co., Chicago, Ill.
 O. K. Tool Co., Inc., The, Shelton, Conn.
 Williams, J. H., & Co., Buffalo, N. Y.
- TOOLS, JIGS, FIXTURES, ETC.—See Jigs, Fixtures, Tools, Etc.**
- TOOLS—Lathe**
 Armstrong Bros. Tool Co., Chicago, Ill.
- TOOLS—Machinists**
 Brown & Sharpe Mfg. Co., Providence, R. I.
- TOOLS—Shaper and Planer**
 O. K. Tool Co., Inc., The, Shelton, Conn.
- TOOLS—Slag Digging**
 Rivet Cutting Gun Co., Cincinnati, Ohio
- TOOLS—Steam and Gas Fitters**
 Saunders, D., Sons, Yonkers, N. Y.
- TORCHES—Blow**
 Hauck Mfg. Co., 128 Tenth St., Brooklyn, N. Y.
- TOWERS—Steel**
 Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.
- TOWERS—Transmission**
 American Bridge Co., 71 Broadway, N. Y. C.
- TOWERS—Water—See Tanks—Elevated Steel and Wood**
- TRACK—Industrial**
 Bethlehem Steel Co., Bethlehem, Pa.
- TRACTORS**
 Tractor, J. T., Company, Cleveland, Ohio.
- TRACTORS—Industrial**
 Tractor, J. T., Company, Cleveland, Ohio.
- TRAILERS—Industrial**
 Chase Fdry. & Mfg. Co., Columbus, Ohio.
- TRAMRAILS—Overhead Systems**
 Armstrong Engineering Co., Euclid, O.
 Chisholm-Moore Mfg. Co., Cleveland, Ohio.
 Cleveland Electric Tramrail, Wickliffe, Ohio.
- TRAMWAYS—Wire Rope**
 American Steel & Wire Co., Chicago, Ill.
 Broderick & Hanson Rope Co., St. Louis, Mo.
 Leech, A., & Sons Rope Co., St. Louis, Mo.
- TRAPS—Steam and Radiator**
 Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.
 Strong, Carlisle & Hammond Co., The, Cleveland, O.
- TREADS—Non-Slipping**
 Hendrick Mfg. Co., Carbondale, Pa.
- TREADS—Stair**
 Hendrick Mfg. Co., Carbondale, Pa.
- TROLLEYS**
 Chisholm-Moore Mfg. Co., Cleveland, Ohio.
 Ford Chain Block Co., Philadelphia, Pa.
 Hanna Engineering Works, Chicago, Ill.
 Shepard Electric Crane & Hoist Co., Montclair Falls, N. Y.
 Wright Mfg. Co., Lisbon, O.
- TRUCKS—Elevating**
 Lewis-Shepard Co., Boston, Mass.
- TRUCKS—Industrial**
 Chase Fdry. & Mfg. Co., Columbus, Ohio.
 Sterling Wheelbarrow Co., Milwaukee, Wis.
- TRUCKS AND TRACTORS—Electric Industrial**
 Atlas Car & Mfg. Co., Cleveland, O.
 Elwell-Parker Elec. Co., Cleveland, O.
- TUBE MILL MACHINERY**
 Standard Engineering Co., Ellwood City, Pa.
 United Engrg. & Fdry. Co., Pittsburgh, Pa.
- TUBE MILL MACHINERY—Seamless**
 Schreck, H. L., Pittsburgh, Pa.
- TUBES—Boiler**
 Allegheny Steel Co., Brackenridge, Pa.
 Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
 Keating, E. F., Co., 452 Water St., N. Y. C.
 National Tube Co., Pittsburgh, Pa.
 Potts, Horace T., & Co., Philadelphia, Pa.
 Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
 Tyler Tube & Pipe Co., The, Washington, Pa.
 Ullman, Jacob, Buffalo, N. Y.
 Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
- TUBES—Boiler, Charcoal Iron**
 Bethlehem Steel Co., Bethlehem, Pa.
 Keating, E. F., Co., 452 Water St., N. Y. C.
 Tyler Tube & Pipe Co., Washington, Pa.
 Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
- TUBES—Nickel Silver**
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
 Seymour Mfg. Co., Seymour, Ct.
 Summerhill Tubing Co., Bridgeport, Montgomery County, Pa.
- TUBING—Brass, Bronze, Copper or Nickel Silver**
 Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
- TUBING—Chrome Alloy**
 Chrome Alloy Tube Corp., Newark, N. J.
- TUBING—Condenser**
 Bridgeport Brass Co., Bridgeport, Conn.
- TUBING—Flexible Metallic**
 American Metal Hose Co., Waterbury, Ct.
 Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
 Roller Bearing Co. of America, Newark, N. J.
- TUBING—Lock Seamed**
 Stolp Company, Inc., Geneva, N. Y.
- TUBING—Monel Metal**
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
- TUBING—Nichrome**
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
- TUBING—Open-Seam**
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
- TUBING—Seamless Aluminum**
 Summerhill Tubing Co., Bridgeport, Montgomery County, Pa.
- TUBING—Seamless Brass and Copper**
 Bridgeport Brass Co., Bridgeport, Conn.
 Rome Mfg. Company, Rome, N. Y.
 Service Steel Company, Detroit, Mich.
 Summerhill Tubing Co., Bridgeport, Montgomery County, Pa.
- TUBING—Seamless, Stainless**
 Firth, Thos., & Sons, Inc., Hartford, Ct.
- TUBING—Seamless Steel**
 Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
 Keating, E. F., Co., 452 Water St., N. Y. C.
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
 National Tube Co., Pittsburgh, Pa.
 Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.
 Service Steel Company, Detroit, Mich.
 Summerhill Tubing Co., Bridgeport, Montgomery County, Pa.
 Tinken Roller Bearing Co., Canton, O.
 Wharton, William, Jr., & Co., Inc., Easton, Pa.
 Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
- TUBING—Square and Rectangular**
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
 National Tube Co., Pittsburgh, Pa.
 Summerhill Tubing Co., Bridgeport, Montgomery County, Pa.
- TUBING—Welded Steel**
 Metal Forming Corp., Elkhart, Ind.
 Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
 National Tube Co., Pittsburgh, Pa.
 Tyler Tube & Pipe Co., The, Washington, Pa.
- TUBING MACHINERY—Brazed**
 Etna Machine Co., The, Toledo, O.
- TUBING MACHINES—Lock Seaming**
 Stolp Company, Inc., Geneva, N. Y.
- TUMBLING BARRELS**
 Baird Machine Co., Bridgeport, Conn.
 Globe Mach. & Stpg. Co., Cleveland, O.
 Ideal Concrete Machry. Co., Cincinnati, O.
 Inaxon, J. W., Co., Philadelphia, Pa.
 Sly, W. W., Mfg. Company, Cleveland, O.
- TUNGSTEN METAL**
 Hardy, Charles, Inc., 100 East 42nd St., New York City.
- TURBINES**
 De Laval Steam Turbine Co., Trenton, N. J.
- TURNBUCKLES**
 Laughlin, Thomas, Co., The, Portland, Me.
 Merrill Bros., Maspeth, N. Y.
- TURNABLES**
 Beardsley & Piper Co., Chicago, Ill.
 Canton Fdry. & Mch. Co., Canton, O.
- TWIST DRILLS**
 Buckeye Twist Drill Co., The, Alliance, O.
 Cleveland Twist Drill Co., Cleveland, O.
 Greenfield Tap & Die Corp., Greenfield, Mass.
 Morse Twist Drill & Mch. Co., New Bedford, Mass.
 National Twist Drill & Tool Co., Detroit, Mich.
 Union Twist Drill Co., Athol, Mass.
- UNIONS**
 Dart, E. M., Mfg. Co., Providence, R. I.
 Jefferson Union Co., Lexington, Mass.
- UPSETTING AND FORGING MACHRY.**
 National Machinery Co., Tiffin, Ohio.
- VALVES—Air**
 Powell, William, Company, Cincinnati, O.
- VALVES—Gas and Air Reversing**
 McKee, Willie, Cleveland, O.
 Morgan Construction Co., Worcester, Mass.
 Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.
 Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
- VALVES—Gas, Water and Steam**
 Jarecki Mfg. Co., Erie, Pa.
 Jenkins Bros., 80 White St., New York City.
 Pittsburgh Valve Fdry. & Con. Co., Pittsburgh, Pa.
 Powell, William, Co., Cincinnati, O.
 Wood, R. D., & Co., Philadelphia, Pa.

VALVES—Hydraulic

Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Powell, William, Company, Cincinnati, O.
Watson-Stilman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.

VALVES—(Pressure Seated) Pneumatic
Cleveland Pneumatic Tool Co., The, Cleveland, O.**VICES**

Jarecki Mfg. Co., Erie, Pa.

WALKWAYS—Open Steel

Irving Iron Works Co., Long Island City, N. Y.

WASHERS—Brass, Bronze or Copper

Everitt Co., The, Boston, Mass.

WASHERS—Iron and Steel

Bethlehem Steel Company, Bethlehem, Pa.
Bettcher Stamping & Mfg. Co., Cleveland, O.
Central Iron & Steel Co., Harrisburg, Pa.
Griffin Mfg. Company, Erie, Pa.
Joliet Wrought Washer Company, Joliet, Ill.
Positive Lock Washer Co., Newark, N. J.
Sessions, J. H., & Son, Bristol, Ct.
Wrought Washer Mfg. Co., Milwaukee, Wis.

WASHERS—Leather

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Schieren, Chas. A., Co., 37 Ferry St., N. Y. C.

WASHERS—Lock

National Umbrella Frame Co., Philadelphia, Pa.
Palnut Co., The, Irvington, N. J.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Spring Steel

Dunbar Bros. Co., Bristol, Ct.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Tempered

Barnes, Wallace, Co., The, Bristol, Ct.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Wrought

Wrought Washer Mfg. Co., Milwaukee, Wis.

WASHING MACHINES—For Metal Parts

Colt's Patent Fire Arms Mfg. Co., Hartford, Ct.
Detroit Sheet Metal Wks., Detroit, Mich.
Ideal Concrete Machry. Co., Cincinnati, O.
No-Dust Drying Mach. Co., Waterbury, Ct.

WATER COOLED FURNACES

Combustion Engng. Corp., 43 Broad St., New York City.

WATER SOFTENING AND PURIFYING

Seale, Wm. B., & Sons Co., Pittsburgh, Pa.

WAX—Vent, Core and Pattern

United Compound Co., Buffalo, N. Y.

WEDGES—Foundry

Sterling Wheelbarrow Co., Milwaukee, Wis.

WELDING—Electric

Federal Mch. & Welder Co., Warren, O.
General Electric Co., Schenectady, N. Y.
Taylor-Hall Welding Corp., 1 May St., Worcester, Mass.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING—Forge and Hammer

Blaw-Knox Co., Pittsburgh, Pa.

WELDING—Oxy-Acetylene

Weldit Acetylene Co., Detroit, Mich.

WELDING—Thermit

Metal & Thermit Corp., 120 Broadway, N. Y. C.

WELDING COMPOUNDS

Anti-Borax Compound Co., Ft. Wayne, Ind.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene

Air Reduction Sales Co., 342 Madison Ave., New York City.
Imperial Brass Mfg. Co., Chicago, Ill.
International Oxygen Co., Newark, N. J.
Weldit Acetylene Co., Detroit, Mich.

WELDING EQUIPMENT—Fluxes

Chemical Treatment Co., Inc., 26 Broadway, New York City.

WELDING MACHINES—Butt

Federal Mch. & Welder Co., Warren, Ohio
Swift Electric Welder Co., 635 Mount Elliott Ave., Detroit, Mich.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING MACHINES—Electric Arc

Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., Wilson Bldg., Hoboken Factory Terminal, Hoboken, N. J.

WELDING MACHINES—(Electric Arc) Second Hand

Goodman Elec. Mchry. Co., Newark, N. J.

WELDING MACHINES—Seam

Federal Mch. & Welder Co., Warren, O.

WELDING MACHINES—Spot

Acme Electric Welder Co., Los Angeles, Cal.
Federal Mch. & Welder Co., Warren, O.
Swift Electric Welder Co., 635 Mount Elliott Ave., Detroit, Mich.
Taylor Welder Co., Warren, O.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING MACHINES—(Spot) Second Hand

Goodman Elec. Mchry. Co., Newark, N. J.

WHEELBARROWS—Foundry

Sterling Wheelbarrow Co., Milwaukee, Wis.

WHEELS—Industrial

Geneva Metal Wheel Company, 145 Railroad St., Geneva, O.

WHEELS—Rolled Steel

Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.

WHEELS—Rubber Tired

Geneva Metal Wheel Company, 145 Railroad St., Geneva, O.

WINCHES

Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

WINDOW CLEANING MATERIALS

Ever-Glow Co., Cleveland, Ohio.
Skybryte Co., The, Cleveland, Ohio.

WINDOWS—Steel

Trucon Steel Co., Youngstown, O.

WIRE—Barb

American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Brass, Bronze, Copper or Nickel Silver

Bridgeport Brass Co., Bridgeport, Conn.
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Broom

American Steel & Wire Co., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Flat, Round, Square or Special Shapes

American Steel Co., Ellwood City, Pa.
American Steel & Wire Co., Chicago, Ill.
De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.
Hartshorn, Stewart, Co., 250 Fifth Ave., New York City.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Roebbing's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Townsend Co., New Brighton, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Insulated

American Steel & Wire Co., Chicago, Ill.

WIRE—Mattress

American Steel & Wire Co., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Netting

American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
New Jersey Wire Cloth Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Nickel

Seymour Mfg. Co., Seymour, Ct.

WIRE—Phosphor Bronze

Phosphor Bronze Smelting Co., Phila., Pa.
Seymour Mfg. Co., Seymour, Ct.

WIRE—Piano and Music

American Steel & Wire Co., Chicago, Ill.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Rubber Covered

American Steel & Wire Co., Chicago, Ill.
Hazard Mfg. Co., Wilkes-Barre, Pa.

WIRE—Spoke and Crimping

American Steel & Wire Co., Chicago, Ill.
Prentiss, Geo. W., & Co., Holyoke, Mass.

WIRE—Spring Steel

American Steel & Wire Co., Chicago, Ill.
Barnes, Wallace Co., The, Bristol, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Hartshorn, Stewart Co., 250 5th Ave., N. Y. C.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Stainless Steel

Firth, Thos., & Sons, Inc., Hartford, Ct.

WIRE—Telephone and Telegraph

American Steel & Wire Co., Chicago, Ill.

WIRE—Trolley

American Steel & Wire Co., Chicago, Ill.
Bridgeport Brass Co., Bridgeport, Conn.

WIRE—Welding

Roebbing's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., Wilson Bldg., Hoboken Factory Terminal, Hoboken, N. J.

WIRE COILING MACHINERY

Baird Machine Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE DRAWING MACHINERY

Morgan Construction Co., Worcester, Mass.
New England Wire Machinery Co., New Haven, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machry. Co., Cuyahoga Falls, O.
Waterbury-Farrell Fdry. & Mach. Co., Waterbury, Ct.

WIRE FORMING MACHINERY

Baird Machine Co., Bridgeport, Ct.
Manville, E. J., Mach. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE MILL MACHINERY AND EQUIPMENT

Morgan Construction Co., Worcester, Mass.
New England Wire Machinery Co., New Haven, Conn.
Shuster, F. B., Co., New Haven, Ct.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAIL MACHINERY

National Machinery Co., Tiffin, O.
Eyrson, Jos. T., & Son, Inc., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic

Nilson, A. H., Machine Co., Bridgeport, Ct.
Shuster, F. B., Co., New Haven, Ct.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

WIRE STRANDING & CLOSING MACHINES

New England Wire Machinery Co., New Haven, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CLOTH

Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
N. J. Wire Cloth Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE CLOTH—Brass, Bronze or Copper

Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

WIRE FORMING

American Spiral Spring & Mfg. Co., Pittsburgh, Pa.
American Steel & Wire Co., Chicago, Ill.
Cleveland Wire Spring Co., Cleveland, O.
Cuyahoga Spring Co., Cleveland, O.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Jenkinson, R. G., & Co., Newark, N. J.
Torrington Co., Torrington, Ct.
Warner Brothers Co., Bridgeport, Ct.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE ROPE

American Cable Co., Inc., 105 Hudson St., New York City.
American Steel & Wire Co., Chicago, Ill.
Broderick & Bascom Rope Co., St. Louis, Mo.
Hazard Mfg. Co., Wilkes-Barre, Pa.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Roebbing's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE ROPE FITTINGS

American Cable Co., Inc., 105 Hudson St., New York City.
American Steel & Wire Co., Chicago, Ill.
Laughlin, Thomas, Co., The, Portland, Me.
Roebbing's, John A., Sons Co., Trenton, N. J.

WOOD BLOCK FLOORING—See Flooring—Creosoted Wood**WOOD WORKING MACHINERY**

Machinery Dealers, Inc., New Haven, Conn.
Osborne & Sexton Machry. Co., Columbus, O.

WRENCHES

Armstrong Bros. Tool Co., Chicago, Ill.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Drop Forging Co. of N. Y., Jersey City, N. J.
Indianapolis Drop Forging Co., Indianapolis, Ind.
Williams, J. H., & Co., Buffalo, N. Y.

ZINC—Cold Rolled Strips

Ball Bros. Co., Muncie, Ind.
Platt Bros. & Co., The, Waterbury, Ct.

ZINC—Slab (Spelter)

Ball Bros. Co., Muncie, Ind.
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United Metals Selling Co., 25 B'way, N. Y. C.

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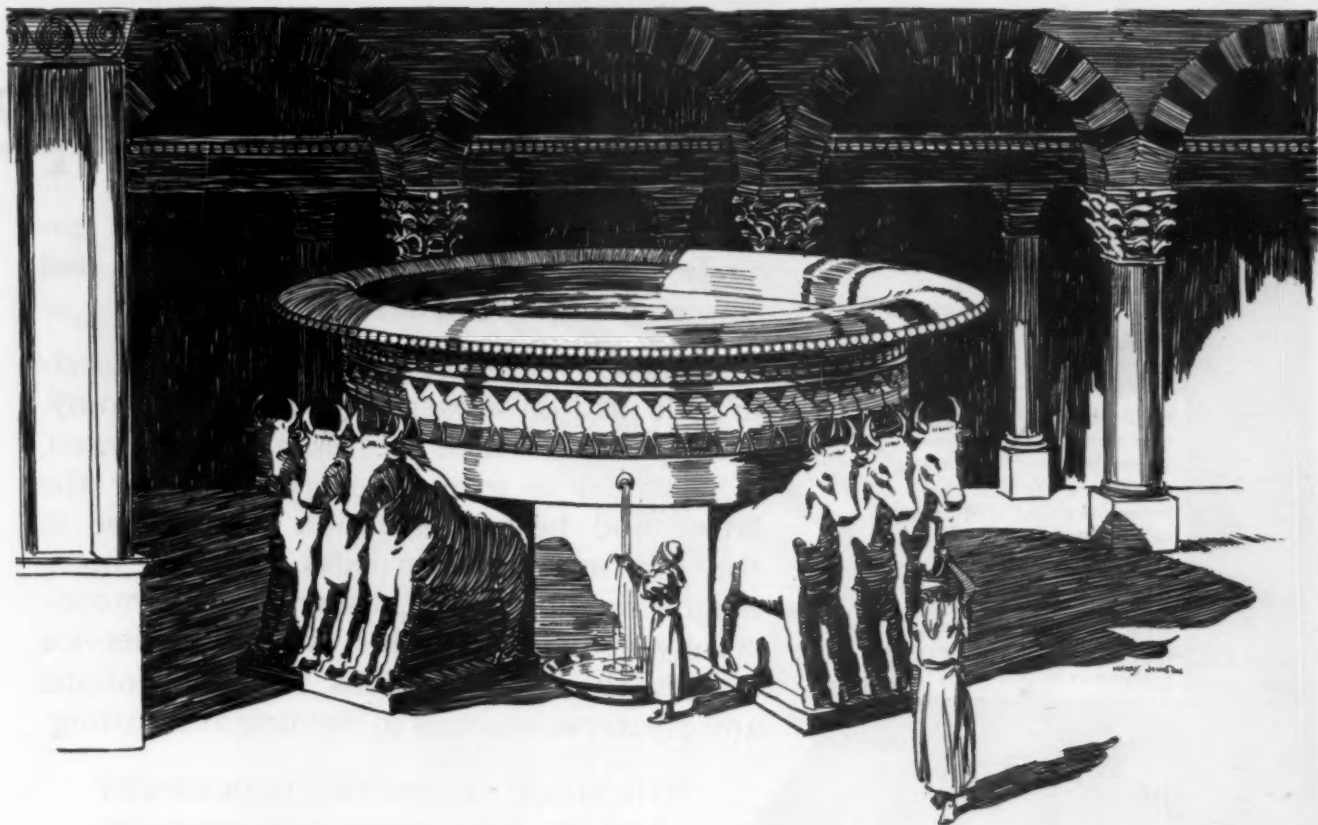
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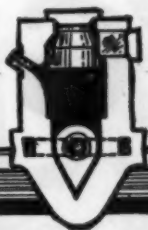
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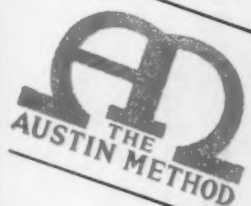
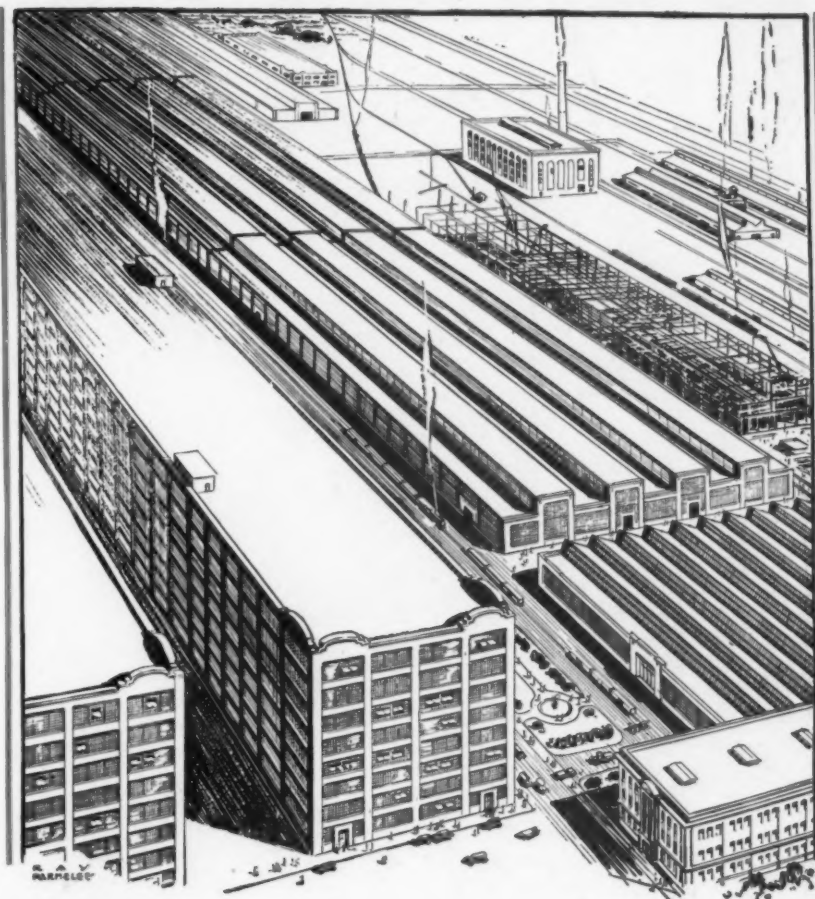
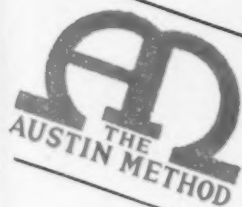
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